The Yellowstone River Instream Reservation

DEC. 16, 1982 - DEC. 15, 1983

FIFTH ANNUAL REPORT
AND
FIVE YEAR SUMMARY

Compiled By

Larry Peterman and Fred Nelson

Fisheries Division
Department of Fish, Wildlife and Parks

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THE YELLOWSTONE RIVER

INSTREAM

RESERVATION

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AND FIVE YEAR SUMMARY
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Montana Department of Fish, Wildlife and Parks
1420 East Sixth Avenue
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December, 1983

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INTRODUCTION

The Order of the Board of Natural Resources and Conservation establishing water reservations for the Yellowstone basin was signed on December 15, 1978. As a result of that Order, the Department of Fish, Wildlife and Parks (MDFWP) was granted an instream reservation for the Yellowstone at Sidney of approximately 5.5 million acre-feet of water with varying amounts granted in upstream areas and tributaries.

The MDFWP applied for instream reservations on many streams and tributaries where little, if any, flow data were available. In granting an instream reservation for those waters, the Board frequently granted a percentile flow rather than a specific amount of water in acre-feet or cfs. In such areas, the department was directed by the Board through condition 116 to develop and submit to the Board within 5 years of December 15, 1978, a plan to convert the minimum flow instream reservation quantities into cubic feet of water per second and acre-feet of water per month.

Condition 117 states that the reservant shall submit to the Board an annual progress report setting forth accomplishments toward completion of such work as outlined in condition 116, a schedule of anticipated progress and other information as may be required. This report is designed to fulfill the requirement of the fifth-year annual progress report and to also summarize events pertaining to the instream reservations which occurred in the past five years. These include a discussion of legal proceedings, water availability in the Yellowstone River at Billings, and problems peculiar to the Tongue River.

COMPLETED INSTREAM FLOW QUANTIFICATIONS USING EXISTING GAGE DATA

A search of existing streamflow data was done to determine which streams had sufficient, continuous, long-term streamflow records to enable quantification of certain instream reservations. Existing flow records at USGS gage sites are sufficient for five streams having an instream reservation and the granted percentile flows have been quantified. These are:

1. Bluewater Creek (mouth-headwaters)
   Gage # 6-2078 at stream mile 12.1

2. Brackett Creek (mouth-Sheep Creek)
   Gage # 6-1940 at stream mile 4.7

3. Rock Creek (mouth-Custer National Forest)
   Gage # 6-2095 at stream mile 46.0

4. Sweet Grass Creek (mouth-Forest Service boundary)
   Gage # 6-2005 at stream mile 58.6

5. Clarks Fork Yellowstone River
   Gage # 6-2075 (Near Belfry) at river mile 71.2

   and

   Clarks Fork Yellowstone River
   Gage # 6-2085 (At Edgar) at river mile 22.1

The percentile flows were derived by the USGS using their computer program titled K956 Daily Values Duration Hydrograph Tables and Plots. The computer printouts for the Clarks Fork sites, which were completed during this report period, are attached in Appendix A. The granted percentile flows for the five streams in terms of cubic feet of water per second and acre-feet of water per month are presented in Table 1.

In addition, sufficient, long-term gage records are available for computing the granted percentile flows during the non-winter months at site on Red Lodge Creek (#6-2110) and Willow Creek (#6-2115) in the Clarks Fork drainage. These gages were established by the USGS in 1937 and have operated to the present. However, no winter records are available for most years. The present computer program of the USGS is incapable of analyzing those years having partial flow records. The percentile flows at these two sites could be derived for the non-winter months if the appropriate computer

Table 1. Quantification of granted percentile flows in cubic feet of water per second and acre-feet per month.

	Bluewater Creek 85th Percentile		Brackett Creek 50th Percentile	
	cfs	AF	cfs	AF
Jan.	26.7	1,641	7.1	436
Feb.	27.0	1,499	6.3	350
Mar.	27.4	1,684	9.2	566
Apr.	28.1	1,672	41.7	2,481
May	27.1	1,666	100.0	6,147
Jun.	26.1	1,553	78.8	4,688
Jul.	24.2	1,488	26.8	1,647
Aug.	24.8	1,525	10.9	670
Sep.	26.1	1,553	10.7	637
Oct.	26.7	1,641	9.9	609
Nov.	26.1	1,553	9.0	535
Dec.	26.7	1,641	6.6	406
		19,116 AF/year		19,172 AF/year

	Rock Creek 85th Percentile		Sweet Grass Creek 90th Percentile	
	cfs	AF	cfs	AF
Jan.	30.8	1,893	8.7	535
Feb.	28.3	1,571	7.8	433
Mar.	26.8	1,647	7.7	473
Apr.	32.0	1,904	10.0	595
May	116.0	7,131	82.2	5,053
Jun.	426.5	25,372	260.0	15,467
Jul.	344.5	21,177	115.0	7,069
Aug.	213.0	13,094	50.3	3,092
Sep.	117.5	6,990	29.9	1,779
Oct.	68.7	4,223	26.0	1,598
Nov.	48.1	2,861	17.7	1,053
Dec.	37.5	2,305	10.9	670
		90,168 AF/year		37,817 AF/year

Table 1 continued.

	Clarks Fork Yellowstone River Near Belfry 70th Percentile (June-Sept.) 90th Percentile (Oct.-May)		Clarks Fork Yellowstone River at Edgar 70th Percentile (June-Sept.) 90th Percentile (Oct.-May)	
	cfs	AF	cfs	AF
Jan.	170	10,450	278	17,089
Feb.	168	9,328	287	15,935
Mar.	160	9,836	298	18,319
Apr.	245	14,575	353	21,000
May	1,030	63,317	1,000	61,473
Jun.	3,360	199,886	3,420	203,456
Jul.	1,580	97,127	1,430	87,906
Aug.	423	26,003	381	23,421
Sept.	240	14,278	346	20,584
Oct.	122	7,500	332	20,409
Nov.	200	11,898	364	21,654
Dec.	180	11,065	320	19,671
		475,263 AF/year		530,917 AF/year

program was available. The Helena office of the USGS plans to have the capability of analyzing these partial records in the near future after their new computer is installed.

For Hanging Woman, Otter, Pumpkin, and Rosebud (Yellowstone) creeks, only one more year of gaging by the USGS is required to complete 10 years of continuous records. No other data collection is needed at these sites, and the necessary analyses can be performed when the additional data become available. In addition, the MDFWP established a gage station at the mouth of the Shields River in 1978. This station will be operated until 10 years of record are obtained.

RIGGS' METHOD, EVALUATION AND WORK PLAN

The first annual progress report outlined a tentative plan for accomplishing the objectives in condition 116. The tentative plan was then reviewed, commented on and revised. In the second annual report, a finalized plan to convert the minimum-flow instream reservations for those streams having little or no flow data into cubic feet of water per second and acre-feet of water per month using hydrologic modeling techniques was submitted to the Board. This was done pursuant to the Board's order, specifically condition 116(b). The Department of Natural Resources and Conservation (DNRC) concurred in the plan as presented and additionally suggested a provision for verifying the chosen methodology (Riggs' Method) using existing long-term gage stations in the area. The testing and verification of the Riggs' Method were performed by Systems Technology, Inc. and presented verbally to the Board. A write-up of the verification is contained in the third annual report. The findings in general were very good, and the report states that better results than those obtained during the verification can be achieved through a careful study of basin characteristics for all gaged streams in the Upper Yellowstone Basin and the omission of hydrologically different streams.

The finalized plan for quantifying the percentile flows was approved by the Board on June 5, 1981.

Plan and Schedule for Data Collection

The quantification of the granted percentile flows for those streams having insufficient flow records will be completed by the Helena office of the USGS through an extension of a cost-share, cooperative agreement with the MDFWP. The agreement specifies that the necessary field measurements will be completed by the USGS in two years and all data analyses and quantifications completed by the end of the third year.

The application of the Riggs' Method requires that monthly flow measurements be taken for one year on the streams to be analyzed. During the first year of the agreement, these monthly flow measurements were collected at 19 ungaged sites on streams within the Upper Yellowstone River drainage upstream from Livingston, Montana. These sites are as follows:

1. Bear Creek above North Fork near Jardine
2. Cinnabar Creek above Cottonwood Creek near Gardiner
3. Cinnabar Creek above confluence with Mol Heron Creek near Gardiner

4. Mol Heron Creek above confluence with Cinnabar Creek near Gardiner
5. Cedar Creek at Mouth near Gardiner
6. Tom Miner Creek above Canyon Creek near Gardiner
7. Tom Miner Creek at Mouth near Gardiner
8. Rock Creek at Mouth near Gardiner
9. Sixmile Creek above diversions near Emigrant
10. Fridley Creek above Miller Creek near Emigrant
11. Fridley Creek at Mouth near Emigrant
12. Coke Creek near Livingston
13. Eightmile Creek above Mouth (Sec. 33) near Pray
14. Mill Creek above diversions near Pray
15. Trail Creek above Pine Creek near Livingston
16. Suce Creek at Mouth near Livingston
17. Billman Creek above Coke Creek near Livingston
18. Billman Creek at Mouth at Livingston
19. Fleshman Creek at Mouth at Livingston

Sites on Cedar Creek above its Second Fork and Eight Mile Creek above Big Draw were originally slated for quantification during the first year, but were dropped by the USGS due to poor access to the sites.

The Riggs' Method, as described in the Third Annual Yellowstone Instream Reservation Report, is to be applied at these sites using the flows at the USGS gage station on Big Creek (#6-1918) for correlation. This gage was established in September 1973, discontinued in September 1979, and reactivated, using MDFWP funds, in October 1982.

The flow measurements on the unquantified streams were originally scheduled to begin in March 1982, but were delayed until November 1982 to correspond to the reactivation of the Big Creek gage. Monthly flow measurements at the 19 sites were completed in October 1983, with the quantification of the percentile flows for all these sites to be completed by April 1984.

Flow measurements for the unquantified tributaries to the Shields River and Yellowstone River downstream from Livingston began in November 1983, are scheduled to end in October 1984, and the quantification of the percentile flows completed by April 1985. These stream sites are as follows:

Shields River Tributaries

1. Smith Creek near Wilsall
2. Flathead Creek above Cache Creek near Wilsall
3. Flathead Creek above Muddy Creek near Wilsall
4. Flathead Creek below Potter Creek near Wilsall
5. Cottonwood Creek above Slippery Creek near Clyde Park
6. Cottonwood creek below Little Cottonwood Creek near Clyde Park
7. Rock Creek below Little Rock Creek near Clyde Park
8. Brackett Creek above Fox Creek near Clyde Park
9. South Fork Brackett Creek near Clyde Park
10. Middle Fork Brackett Creek near Clyde Park
11. North Fork Brackett Creek near Clyde Park

Yellowstone River Tributaries

1. Little Mission Creek near Livingston
2. Mission Creek above Little Mission Creek near Livingston
3. Lower Deer Creek above Log Cabin Creek near Greycliff
4. Bridger Creek below the Forks near Greycliff
5. Sweetgrass Creek near mouth
6. Upper Deer Creek below West Fork near Greycliff

The Riggs' Method is to be applied at these sites using the flows at the USGS gage stations on Brackett Creek (#6-1940) and Sweetgrass Creek (#6-2005) for correlation. These gages were reactivated for this project.

Additional work is being conducted on Sweetgrass Creek near its mouth since the quantification in Table 1 pertains to the USGS gage site near the uppermost boundary of the stream section at stream mile 58.6 and therefore do not reflect stream flows in the lower creek.

Preliminary Findings Using the Riggs' Method

The USGS has provided the MDFWP with a preliminary quantification of the percentile flows for those streams measured during the first year of the study. These preliminary results, which are presented in Appendix B, are subject to revision pending further analyses by the USGS. A letter report containing the finalized quantifications is scheduled for completion by April, 1984.

Completed Field Measurements

Instantaneous flow measurements that have been collected in conjunction with other studies by the USGS and the MDFWP are sufficient for use in the Riggs' Method for defining the granted percentile flows for many of the stream reaches having an instream reservation. Short-term USGS gage records for many sites are also suitable for use in the Riggs' Method. At other sites, additional flow measurements may be needed to supplement existing records or fill in voids in the data. These sites and a brief summary of the existing flow records are listed in Table 2. For those sites marked with an asterisk, existing flow records are judged sufficient for deriving the monthly percentile flows, provided these measurements can be correlated with the flows at established gage sites having long-term records. The granted percentile flows at these sites are scheduled to be quantified by October 1985.

Table 2. Summary of available short-term USGS gage records and instantaneous flow measurements for streams having an instream flow reservation.

Stillwater Tributaries

*1. Castle Creek (mouth - 1,500 ft. above Picket Pin Creek)
12 monthly measurements by the USGS, 1972-73

*2. East Rosebud Creek (Custer National Forest boundary - West Rosebud Creek)
USGS gage at Roscoe, 1922-24

*3. Fishtail Creek (mouth - confluence of East and West Fishtail creeks)
8 measurements by the USGS, 1981-82
12 monthly measurements by the USGS, 1982-83

*4. Picket Pin Creek (mouth - Swamp Creek)
18 measurements by the MDFWP, 1975-76

*5. West Fork of Stillwater (mouth - Castle Creek)
12 monthly measurements by the USGS, 1970-71
11 monthly measurements by the USGS, 1971-72
12 monthly measurements by the USGS, 1972-73
8 measurements by the USGS, 1981-82
12 monthly measurements by the USGS, 1982-83

6. West Fork of Stillwater (Castle Creek - Sweetgrass/Stillwater Co. line)
14 measurements by the MDFWP, 1975-76
No high flow measurements

*7. West Fork of Stillwater (Sweetgrass/Stillwater Co. line - Tumble Creek)
7 measurements by the USGS, 1981-82
6 measurements by the USGS, 1982-83
14 measurements by the MDFWP, 1975-76
No high flow measurements

*8. Butcher Creek (W. Butcher Creek - mouth)
USGS gage #6-2043, 1960-62
Also three sites with 7-14 measurements by the USGS, 1960-61

Yellowstone Tributaries

*9. Bear Creek (mouth - North Fork of Bear Creek)
USGS gage #6-1895, 1946-49

*10. Big Creek (mouth - Millfork Creek)
USGS gage # 6-1918, 1973 - present; will be operated for 10 years

*11. Mill Creek (mouth - East Fork)
USGS gage #6-1920, 1951-56

FIVE YEAR PROGRESS REPORT FOR QUANTIFYING THE GRANTED PERCENTILE FLOWS

To date, the quantification of the granted percentile flows has been completed for five stream sections having an instream flow reservation. Preliminary quantifications have been completed for an additional 19 sections on 15 streams. By October 1985, a total of approximately 57 stream sections are scheduled for quantification, leaving approximately 20 to be completed. The remaining 20 include spring creeks in the Upper Yellowstone drainage, sites in the Upper Yellowstone and Shields drainages in which access was blocked by private lands or unobtainable due to the lack of roads, USGS gaging sites needing additional years of record, and tributaries to the Stillwater and Clarks Fork rivers, areas where quantification has not proceeded as yet. The status of the various streams is summarized in Table 3.

The four spring-fed streams in the Upper Yellowstone drainage above Livingston are not amenable to the Riggs' method and may require a more intensive data collection program and likely a different quantification method.

Table 3. Summary of the progress of the MDFWP in quantifying the granted percentile flows for the Yellowstone Instream Flow Reservation.

Gaged Stream Sections - Completed Record

Quantification Completed

Sweetgrass Creek
Forest Service boundary-mouth

Rock Creek
Custer National Forest-mouth

Bluewater Creek
Headwaters-mouth

Brackett Creek
Mouth-Sheep Creek

Clarks Fork Yellowstone River

Table 3 Continued.

Quantification Pending

Willow Creek
Forest Boundary-Cooney Reservoir

Red Lodge Creek
Custer National Forest-Cooney Reservoir

Gaged Stream Sections - Need Additional Years of Record

One Year of Record Needed

Rosebud Creek
Cottonwood Creek-Yellowstone River

Hanging Woman Creek
Mouth of East Fork-Tongue River

Otter Creek
Mouth of Bear Creek-Tongue River

Pumpkin Creek
Mouth of Deer Creek-Tongue River

Five Years of Record Needed

Shields River at mouth

Riggs' Method - Quantified by April 1984

Bear Creek
Mouth-North Fork of Bear Creek
North Fork of Bear Creek-Fish Creek

Billman Creek
Mouth-Mouth of Coke Creek
Coke Creek-Fork South of NE Corner, Sec. 20

Cedar Creek
Mouth-Second Fork of Cedar Creek

Cinnabar Creek
Mouth-Cottonwood Creek
Cottonwood Creek-Forest Service Boundary (T8S, R7W, S32)

Table 3 Continued.

Coke Creek
Mouth-Minor Creek

Eightmile Creek
Mouth-Big Draw

Fleshman Creek
Mouth-Perkins Creek

Fridley Creek
Mouth-Miller Creek
Miller Creek-Needle Creek

Mill Creek
Mouth-East Fork

Mol Heron Creek
Mouth-Cinnabar Creek
Cinnabar Creek-Yellowstone Park boundary

Rock Creek
Mouth-Steele Creek

Six Mile Creek
Mouth-North Fork of Six Mile Creek

Suce Creek
Mouth-Lost Creek

Tom Miner Creek
Mouth-Canyon Creek
Canyon Creek-Trail Creek

Trail Creek
West Pine Creek-South boundary of Sec. 35

Riggs' Method - Quantified by April 1985

Brackett Creek
Sheep Creek-Skunk Creek
Skunk Creek-Confluence of North, Middle & South forks
One mile up North Fork
One mile up Middle Fork
One mile up South Fork

Cottonwood Creek
Mouth-Little Cottonwood Creek
Little Cottonwood Creek-Trespass Creek

Table 3 Continued.

Flathead Creek
Mouth-Muddy Creek
Muddy Creek-Cache Creek
Cache Creek-South Fork of Flathead Creek

Rock Creek
Mouth-Forest Service West boundary in Sec. 8

Smith Creek
Mouth-Bitter Creek

Bridger Creek
Headwaters-Krone Ditch Headgate

Little Mission Creek
Mouth-Little Mission Forks

Lower Deer Creek
Headwaters-Interstate Highway 90

Mission Creek
Mouth-Little Bear Draw

Sweet Grass Creek
Forest Service boundary-mouth

Upper Deer Creek
Headwaters-point upstream from Interstate 90 Bridge

Riggs' Method - Quantified by October 1985

Castle Creek
Mouth-1,500 ft above Picket Pin Creek

East Rosebud Creek
Custer National Forest boundary-West Rosebud Creek

Fishtail Creek
Confluence of East and West Fishtail creeks-Mouth

Picket Pin Creek
Mouth-Mouth of Swamp Creek

West Fork of Stillwater River
Mouth-Castle Creek
Castle Creek-Sweetgrass/Stillwater County Line
Sweetgrass/Stillwater County Line-Tumble Creek

Butcher Creek
West Butcher Creek-Mouth

Table 3 Continued.

Remaining Stream Sections Needing Quantification

Yellowstone Tributaries

Big Creek
Mill Fork Creek-Bark Cabin Creek

Cedar Creek
Second Fork-North Fork

Eight Mile Creek
Big Draw-North Fork of Eight Mile Creek

Trail Creek
Mouth-West Pine Creek

Armstrong Spring Creek
Mouth-Origin

Nelson Spring Creek
Mouth-Origin

McDonald Spring Creek
Mouth-Northern boundary of Sec. 32

Emigrant Spring Creek
Mouth-Origin

Shields River Tributaries

Rock Creek
Forest Service West Boundary in Sec. 8
-Smeller Creek

Stillwater River Tributaries

East Fishtail Creek
West Fishtail Creek-its East Fork

Little Rocky Creek
Mouth-Forest Service Road #1414

West Fishtail Creek
East Fishtail Creek-Richmond/Kennedy Ditch

Table 3 Continued.

Stillwater River Tributaries Continued

West Rosebud Creek
Custer National Forest boundary-Fiddler Creek
Fiddler Creek-Mouth

Butcher Creek
Headwaters-West Butcher Creek

Clarks Fork Tributaries

Clear Creek
Headwaters-Mouth

Dry Creek
Headwaters-Mouth

Sage Creek
Headwaters-Crow Reservation

WATER AVAILABILITY - YELLOWSTONE RIVER AT BILLINGS

In 1979, after the Yellowstone Reservation was established, a problem was noted in the reservations granted for the Yellowstone at Billings with respect to the availability of water allocated to the conservation districts. The problem was perceived as follows.

The MDFWP was granted an instream flow reservation for August and September of 4,090 and 3,415 cfs, respectively. This corresponds roughly to the 65th percentile flow and means that water in excess of our reservation occurs approximately 65 years out of 100. Flows granted for May, June and July represent approximately the 85th percentile level. The instream reservations were given second priority in this reach.

The conservation districts at Billings and upstream were granted reservations totaling 207,764 af/yr and were given third priority. To economically develop efficient, full-service irrigation systems, a good water supply is usually considered to be necessary about 8 years out of 10, on the average.

Since these conservation district reservations are junior to the instream reservation, they are subject to a certain water availability constraint. For the months of August and September, the constraint imposed by the 65th percentile instream flow level does not allow for the economic development of the water reserved for the conservation districts in this reach of river.

After consideration of the matter, the MDFWP determined that the instream flow reservation could be reduced during the irrigation season (May 1 through September 30) to the levels indicated in Table 4. These levels should not cause serious degradation of the aquatic and recreational resources in that reach of the Yellowstone. The priority of the instream reservation would prevent future irrigation withdrawals from increasing the frequency or severity of low flow events. At the same time, water availability to the conservation districts would be increased.

In addition, the purpose of the high water period (May-July 10) is to provide flows sufficient to initiate bedload movement (Dominant Discharge) and sediment transport. The annual flushing action cleanses intergravel spaces assuring successful fish reproduction and adequate food production. With adequate high flows, the existing channel morphology is assured.

Table 4. Revised MDFWP Proposed Instream Flow Reservation, Yellowstone River at Billings, Montana (May 1-September 30).

Month	Flow CFS	Flow Acre-ft		Approx. Percentile
May (1-20)	5,124	203,199		90.0
May (21-31)	12,204	266,214		
Jun (1-7)	17,242	239,337		87.8
Jun (8-30)	19,042	868,487		
Jul (1-10)	10,277	203,786	84.3%	91.1
Jul (11-31)	4,000	153,720	97.5%	
Aug	3,500	215,156		83.0
Sep	3,000	178,470		82.3

It is recognized that the only real possibility for altering the spring hydrograph and materially affecting channel configuration on the Yellowstone is a mainstem impoundment. Normal irrigation demands on the Yellowstone during the high flow months should not significantly affect the spring hydrograph. With this in mind, MDFWP suggested that those lands which are developed for irrigation with waters granted to the conservation districts and subject to water availability constraints from July 11 through September 30, would not be subject to water availability constraints from May 1 through July 10.

The principal irrigated crop in the Yellowstone basin upstream from Billings is hay, although some cash crop farming exists. The lack of water availability constraints during the high flow months should allow for the production of two hay crops during most years, even if water is somewhat restricted during August and September during drought years.

On November 21, 1980, the Board amended the original order, reducing the instream flow reservation during the irrigation season (May 1 through September 30) to the levels indicated in Table 5, thus increasing water availability for the upper river conservation districts. The total instream flow reservation at Billings was reduced from 3,902,134 acre-feet of water per year to 3,679,968 acre-feet.

One question remains concerning the water availability situation above Billings. It has been pointed out that, while MDFWP agreed to allow unrestricted depletions from conservation district reservations to occur from May 1 through July 10, this may not be legally binding at some point in the future. To alleviate this concern, MDFWP will offer to enter into a legally binding contract with the upper river conservation districts, whereby the MDFWP will stipulate that the instream reservation will not interfere with the utilization of the conservation district reservation for the period of May 1 through July 10, under any circumstances.

Table 5. Amended instream flow reservation, Yellowstone River at Billings, Montana (May 1-September 30).

Month	Flow		Approx. Percentile
	CFS	Acre-ft	
May (1-20)	5,121	203,132	91.3
May (21-31)	12,200	266,177	81.3
Jun (1-7)	17,236	239,306	83.8
Jun (8-30)	18,716	853,816	81.0
Jul (1-10)	10,274	203,781	85.2
Jul (11-31)	4,000	166,611	95.5
Aug	3,500	215,205	83.0
Sept	3,107	184,878	81.0

YELLOWSTONE RIVER INSTREAM FLOW UPDATE
TONGUE RIVER

The Tongue River is a north-flowing tributary to the Yellowstone River important to the Lower Yellowstone Basin. Streamflows are largely controlled by the Tongue River Dam near the Wyoming border. The lower portion of the Tongue River is important to Yellowstone River fish populations. Spring spawning sauger and shovelnose sturgeon enter the Tongue River in spring when streamflows are high, spawn, and then return to the Yellowstone River.

Maintenance of the resident fish populations and suitable spawning areas for migratory species is dependent on adequate flows in the Tongue. The department requested instream flows at the mouth of the Tongue River amounting to 290,000 acre-feet per year. Recommended flows ranged from 190 cfs during late fall and winter to 600 cfs during the spring period. These flows were designed to maintain both the resident and migratory fish populations.

The flow reservation granted on the Tongue River totaled 54,289 af/yr, or an average of 75 cfs for each month. The original request was reduced to allow as much firm water as possible for the proposed new Tongue River Dam. While 75 cfs could be considered a good flow during the summer when the river has historically gone dry, 75 cfs cannot be considered an adequate flow at other times.

In recent years, streamflows in the Lower Tongue in April and May have been unseasonably low and insufficient to attract sauger and shovelnose sturgeon spawners from the Yellowstone. The flows were, however, in the range of those granted by the Board for instream purposes.

The following is a brief description of the results of field sampling for sauger and shovelnose sturgeon in the Lower Tongue River, as related to streamflows, for the years 1980 through 1982.

1980

Streamflows decreased through April and May causing very low numbers of sauger and shovelnose sturgeon to enter the river. Streamflows never reached recommended minimums in April and May. Significantly larger flows in June came too late to attract fish into the Tongue River.

1981

April and May streamflows were very low. Very few sauger entered the river. No shovelnose sturgeon were sampled. Again, large

streamflows in June came after the sauger spawning season and too late to attract shovelnose sturgeon migrants.

1982

Streamflows were somewhat better than in 1981, but still well below requested instream flows. Resultant sauger movement into the Lower Tongue River was low. Some sturgeon moved into the Tongue River, but numbers were far below those of good flow years such as 1974, 1975 and 1976. Spawning by both species apparently failed as no larval sauger or shovelnose sturgeon were present in drift samples.

Recent low spring flows during the past several years have illustrated the inadequacies of the instream flow reservation for the Tongue River. Streamflow in the Tongue River is dependent upon releases from the Tongue River Dam. Future development plans for the Tongue River Dam should consider restoration of that portion of the spring flows for fisheries purposes.

UPDATE OF LEGAL PROCEEDINGS RELATED TO YELLOWSTONE RIVER WATER RESERVATION

Since December 15, 1978, when the Board established the Yellowstone Water Reservations, a number of legal issues have been raised and resolved. These issues have been discussed in detail in the Annual Instream Reservation reports (numbers 1, 2 and 3). The Utah V DF & G, et al. case is the only case not settled or otherwise disposed of at this time.

APPENDIX

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06207500 CLARKS FORK YELLOWSTONE RIVER NEAR BELFRY, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 49-YEAR PERIOD BETWEEN WATER YEARS 1926 AND 1974

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
1-01	406.00	314.00	292.00	284.00	240.00	196.00	180.00	150.00	140.00
1-02	378.00	301.00	288.00	270.00	240.00	200.00	180.00	165.00	140.00
1-03	362.00	300.00	273.00	265.00	235.00	203.00	180.00	150.00	120.00
1-04	351.00	309.00	280.00	265.00	230.00	205.00	180.00	150.00	122.00
1-05	362.00	301.00	290.00	270.00	230.00	210.00	180.00	150.00	130.00
1-06	362.00	321.00	290.00	260.00	228.00	205.00	180.00	150.00	120.00
1-07	351.00	326.00	290.00	272.00	235.00	210.00	180.00	150.00	140.00
1-08	360.00	326.00	289.00	278.00	240.00	202.00	180.00	160.00	140.00
1-09	370.00	306.00	296.00	268.00	230.00	210.00	180.00	170.00	140.00
1-10	380.00	306.00	290.00	264.00	234.00	202.00	180.00	170.00	113.00
1-11	346.00	312.00	290.00	284.00	236.00	200.00	180.00	170.00	105.00
1-12	360.00	320.00	300.00	280.00	234.00	200.00	181.00	170.00	100.00
1-13	380.00	320.00	300.00	280.00	235.00	200.00	180.00	164.00	130.00
1-14	400.00	331.00	310.00	270.00	220.00	200.00	180.00	150.00	140.00
1-15	444.00	326.00	301.00	260.00	230.00	200.00	180.00	152.00	100.00
1-16	494.00	330.00	289.00	255.00	222.00	200.00	180.00	150.00	94.00
1-17	384.00	326.00	296.00	261.00	222.00	193.00	175.00	150.00	70.00
1-18	390.00	320.00	278.00	253.00	230.00	191.00	180.00	150.00	70.00
1-19	420.00	300.00	276.00	250.00	225.00	195.00	180.00	155.00	100.00
1-20	435.00	296.00	270.00	255.00	215.00	196.00	180.00	150.00	140.00
1-21	410.00	284.00	276.00	260.00	220.00	196.00	180.00	170.00	140.00
1-22	370.00	300.00	278.00	263.00	230.00	200.00	180.00	170.00	140.00
1-23	327.00	300.00	268.00	255.00	235.00	200.00	185.00	170.00	140.00
1-24	331.00	300.00	284.00	265.00	230.00	200.00	180.00	155.00	140.00
1-25	330.00	300.00	284.00	250.00	225.00	198.00	180.00	160.00	140.00
1-26	341.00	296.00	276.00	255.00	228.00	195.00	175.00	170.00	140.00
1-27	362.00	299.00	267.00	250.00	220.00	199.00	180.00	160.00	140.00
1-28	357.00	300.00	265.00	250.00	220.00	200.00	180.00	165.00	125.00
1-29	351.00	290.00	280.00	255.00	240.00	193.00	180.00	170.00	125.00
1-30	341.00	290.00	273.00	259.00	220.00	195.00	180.00	160.00	140.00
1-31	341.00	280.00	271.00	257.00	236.00	195.00	180.00	160.00	140.00
MEAN	345.00	282.00	264.00	257.00	242.00	209.00	186.00	170.00	140.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06207500 CLARKS FORK YELLOWSTONE RIVER NEAR BELFRY, MT. . DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 49-YEAR PERIOD BETWEEN WATER YEARS 1926 AND 1974

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
2-01	417.00	290.00	265.00	259.00	230.00	200.00	175.00	150.00	140.00
2-02	395.00	280.00	260.00	255.00	225.00	200.00	180.00	150.00	140.00
2-03	400.00	300.00	270.00	259.00	235.00	204.00	180.00	150.00	150.00
2-04	700.00	301.00	270.00	263.00	240.00	199.00	180.00	150.00	140.00
2-05	594.00	285.00	271.00	261.00	240.00	199.00	180.00	150.00	150.00
2-06	480.00	290.00	261.00	252.00	240.00	200.00	180.00	160.00	150.00
2-07	430.00	284.00	263.00	255.00	238.00	196.00	180.00	150.00	90.00
2-08	385.00	271.00	259.00	251.00	220.00	200.00	180.00	150.00	90.00
2-09	370.00	310.00	258.00	251.00	220.00	191.00	180.00	150.00	100.00
2-10	450.00	299.00	260.00	250.00	220.00	200.00	180.00	150.00	130.00
2-11	420.00	280.00	260.00	250.00	225.00	194.00	180.00	150.00	150.00
2-12	324.00	297.00	271.00	252.00	225.00	200.00	186.00	163.00	150.00
2-13	375.00	300.00	271.00	250.00	233.00	207.00	180.00	158.00	150.00
2-14	420.00	294.00	267.00	255.00	231.00	205.00	180.00	150.00	145.00
2-15	510.00	288.00	263.00	250.00	223.00	200.00	180.00	161.00	150.00
2-16	480.00	281.00	255.00	249.00	220.00	200.00	180.00	158.00	150.00
2-17	440.00	287.00	261.00	250.00	229.00	205.00	180.00	158.00	150.00
2-18	400.00	275.00	260.00	250.00	229.00	200.00	180.00	158.00	150.00
2-19	370.00	284.00	266.00	250.00	220.00	200.00	185.00	161.00	150.00
2-20	364.00	279.00	266.00	250.00	225.00	200.00	180.00	162.00	150.00
2-21	362.00	266.00	259.00	250.00	222.00	200.00	180.00	167.00	150.00
2-22	325.00	271.00	255.00	242.00	220.00	200.00	181.00	170.00	150.00
2-23	330.00	271.00	260.00	247.00	222.00	200.00	177.00	167.00	150.00
2-24	350.00	276.00	258.00	247.00	220.00	181.00	180.00	150.00	150.00
2-25	390.00	282.00	261.00	248.00	222.00	199.00	176.00	150.00	100.00
2-26	380.00	286.00	255.00	250.00	229.00	196.00	177.00	150.00	75.00
2-27	530.00	290.00	255.00	245.00	230.00	196.00	179.00	150.00	100.00
2-28	480.00	278.00	254.00	248.00	221.00	199.00	180.00	150.00	150.00
MEAN	329.00	291.00	256.00	249.00	236.00	202.00	185.00	168.00	150.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06207500 CLARKS FORK YELLOWSTONE RIVER NEAR BELFRY, MT. - DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 49-YEAR PERIOD BETWEEN WATER YEARS 1926 AND 1974

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
3-01	430.00	277.00	244.00	234.00	220.00	200.00	180.00	150.00	130.00
3-02	386.00	261.00	241.00	231.00	210.00	200.00	180.00	150.00	120.00
3-03	314.00	261.00	240.00	229.00	210.00	190.00	175.00	150.00	130.00
3-04	306.00	260.00	233.00	228.00	207.00	186.00	170.00	150.00	125.00
3-05	306.00	266.00	235.00	228.00	204.00	180.00	169.00	140.00	99.00
3-06	339.00	271.00	245.00	232.00	220.00	191.00	165.00	150.00	125.00
3-07	307.00	272.00	242.00	233.00	210.00	184.00	175.00	150.00	130.00
3-08	289.00	263.00	240.00	235.00	220.00	200.00	180.00	150.00	130.00
3-09	299.00	252.00	244.00	240.00	225.00	193.00	172.00	150.00	132.00
3-10	330.00	265.00	243.00	236.00	215.00	189.00	176.00	150.00	120.00
3-11	350.00	263.00	243.00	232.00	202.00	185.00	179.00	150.00	110.00
3-12	359.00	254.00	240.00	231.00	210.00	182.00	170.00	145.00	105.00
3-13	354.00	253.00	243.00	235.00	214.00	190.00	165.00	150.00	105.00
3-14	382.00	256.00	235.00	230.00	215.00	180.00	172.00	150.00	110.00
3-15	379.00	246.00	235.00	225.00	214.00	200.00	171.00	150.00	86.00
3-16	376.00	258.00	241.00	232.00	215.00	198.00	175.00	150.00	123.00
3-17	416.00	257.00	247.00	234.00	220.00	193.00	179.00	154.00	109.00
3-18	466.00	262.00	246.00	237.00	215.00	193.00	178.00	157.00	120.00
3-19	495.00	278.00	250.00	240.00	218.00	193.00	175.00	160.00	80.00
3-20	483.00	289.00	248.00	233.00	214.00	186.00	181.00	163.00	136.00
3-21	441.00	309.00	240.00	233.00	220.00	199.00	186.00	160.00	136.00
3-22	428.00	330.00	256.00	235.00	218.00	197.00	180.00	165.00	131.00
3-23	480.00	386.00	259.00	233.00	218.00	195.00	184.00	152.00	114.00
3-24	600.00	381.00	267.00	244.00	222.00	200.00	185.00	163.00	119.00
3-25	469.00	420.00	269.00	239.00	220.00	200.00	180.00	163.00	119.00
3-26	543.00	392.00	263.00	236.00	220.00	200.00	183.00	150.00	109.00
3-27	524.00	320.00	275.00	251.00	222.00	191.00	176.00	157.00	109.00
3-28	512.00	336.00	276.00	246.00	222.00	200.00	189.00	159.00	114.00
3-29	546.00	316.00	280.00	244.00	225.00	202.00	188.00	165.00	119.00
3-30	560.00	348.00	282.00	260.00	225.00	202.00	190.00	163.00	125.00
3-31	458.00	351.00	320.00	247.00	230.00	200.00	165.00	149.00	116.00
MEAN	364.00	267.00	247.00	239.00	224.00	202.00	185.00	160.00	132.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06207500 CLARKS FORK YELLOWSTONE RIVER NEAR BELFRY, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 49-YEAR PERIOD BETWEEN WATER YEARS 1926 AND 1974

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
4-01	510.00	382.00	288.00	256.00	233.00	213.00	176.00	150.00	136.00
4-02	516.00	340.00	292.00	265.00	230.00	207.00	193.00	158.00	136.00
4-03	442.00	337.00	296.00	271.00	235.00	216.00	190.00	161.00	123.00
4-04	591.00	331.00	301.00	275.00	229.00	216.00	193.00	160.00	133.00
4-05	614.00	354.00	313.00	284.00	232.00	204.00	189.00	165.00	119.00
4-06	614.00	395.00	302.00	288.00	248.00	214.00	196.00	166.00	123.00
4-07	681.00	409.00	321.00	295.00	247.00	213.00	190.00	158.00	114.00
4-08	750.00	450.00	335.00	302.00	241.00	222.00	190.00	156.00	122.00
4-09	864.00	426.00	349.00	308.00	255.00	225.00	184.00	166.00	103.00
4-10	864.00	439.00	364.00	311.00	255.00	225.00	207.00	177.00	106.00
4-11	960.00	498.00	355.00	315.00	259.00	225.00	212.00	168.00	106.00
4-12	941.00	558.00	363.00	329.00	262.00	218.00	209.00	175.00	106.00
4-13	1240.00	549.00	378.00	348.00	284.00	221.00	211.00	169.00	83.00
4-14	1030.00	558.00	454.00	390.00	303.00	250.00	211.00	172.00	95.00
4-15	1480.00	547.00	507.00	414.00	296.00	261.00	214.00	164.00	78.00
4-16	1750.00	695.00	494.00	382.00	315.00	258.00	228.00	172.00	67.00
4-17	1750.00	827.00	489.00	395.00	338.00	259.00	234.00	202.00	63.00
4-18	1610.00	1020.00	544.00	470.00	321.00	249.00	219.00	191.00	54.00
4-19	1610.00	1110.00	587.00	502.00	370.00	255.00	215.00	193.00	52.00
4-20	1840.00	1270.00	706.00	474.00	351.00	258.00	213.00	193.00	63.00
4-21	1710.00	1180.00	641.00	565.00	341.00	255.00	211.00	190.00	61.00
4-22	1650.00	1180.00	726.00	558.00	359.00	280.00	211.00	183.00	52.00
4-23	1880.00	1270.00	882.00	558.00	402.00	276.00	208.00	189.00	50.00
4-24	1960.00	1250.00	858.00	540.00	380.00	264.00	222.00	182.00	69.00
4-25	2090.00	1540.00	956.00	642.00	377.00	289.00	233.00	186.00	72.00
4-26	2010.00	1580.00	975.00	685.00	414.00	284.00	251.00	196.00	33.00
4-27	2270.00	1380.00	1050.00	660.00	491.00	314.00	249.00	222.00	34.00
4-28	2170.00	1520.00	1190.00	758.00	516.00	309.00	268.00	218.00	35.00
4-29	2330.00	1780.00	1160.00	758.00	551.00	337.00	266.00	224.00	37.00
4-30	2500.00	1820.00	1050.00	924.00	565.00	340.00	292.00	223.00	39.00
MEAN	1170.00	817.00	547.00	483.00	366.00	276.00	254.00	245.00	111.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06207500 CLARKS FORK YELLOWSTONE RIVER NEAR BELFRY, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 49-YEAR PERIOD BETWEEN WATER YEARS 1926 AND 1974

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
S-01	2870.00	1850.00	1150.00	820.00	588.00	406.00	308.00	245.00	41.00
S-02	2680.00	1940.00	1120.00	850.00	609.00	414.00	310.00	255.00	42.00
S-03	2800.00	1910.00	1180.00	974.00	586.00	406.00	370.00	259.00	108.00
S-04	3500.00	1990.00	1460.00	1050.00	642.00	443.00	372.00	275.00	88.00
S-05	3400.00	2450.00	1540.00	1090.00	749.00	488.00	376.00	272.00	116.00
S-06	3360.00	2340.00	1680.00	1310.00	939.00	595.00	410.00	311.00	100.00
S-07	4100.00	2170.00	1720.00	1390.00	863.00	648.00	433.00	326.00	63.00
S-08	4600.00	2350.00	1880.00	1380.00	956.00	667.00	422.00	321.00	52.00
S-09	5120.00	2460.00	1940.00	1580.00	920.00	618.00	482.00	331.00	50.00
S-10	5120.00	2970.00	1870.00	1600.00	1160.00	612.00	532.00	331.00	200.00
S-11	5620.00	2820.00	2100.00	1800.00	1170.00	648.00	544.00	357.00	254.00
S-12	6650.00	2970.00	2400.00	1960.00	1130.00	640.00	504.00	370.00	294.00
S-13	5370.00	3210.00	2660.00	2120.00	1160.00	748.00	480.00	416.00	296.00
S-14	4830.00	2930.00	2510.00	2070.00	1350.00	803.00	670.00	450.00	296.00
S-15	5970.00	3260.00	2590.00	2090.00	1320.00	909.00	790.00	438.00	321.00
S-16	6490.00	3280.00	2660.00	2500.00	1460.00	998.00	736.00	522.00	369.00
S-17	5970.00	3690.00	2960.00	2420.00	1730.00	993.00	850.00	622.00	390.00
S-18	5370.00	4230.00	2870.00	2510.00	2050.00	1220.00	954.00	620.00	454.00
S-19	5620.00	3700.00	3200.00	2990.00	1720.00	1160.00	957.00	660.00	501.00
S-20	6390.00	3860.00	3360.00	3160.00	1940.00	1160.00	957.00	753.00	526.00
S-21	6920.00	5010.00	3640.00	3020.00	2120.00	1150.00	970.00	866.00	632.00
S-22	7730.00	5500.00	3330.00	3000.00	2230.00	1380.00	1210.00	864.00	611.00
S-23	8570.00	5060.00	3550.00	2940.00	2210.00	1580.00	1140.00	967.00	623.00
S-24	8570.00	5020.00	4000.00	3100.00	2600.00	1760.00	1360.00	906.00	615.00
S-25	9730.00	5250.00	3880.00	3540.00	2420.00	1820.00	1370.00	1160.00	551.00
S-26	10900.00	5500.00	4220.00	3870.00	2600.00	1900.00	1460.00	1200.00	565.00
S-27	10000.00	6050.00	4480.00	4090.00	2830.00	1960.00	1550.00	1250.00	768.00
S-28	10300.00	5970.00	5010.00	4280.00	3000.00	2430.00	1650.00	1270.00	796.00
S-29	9730.00	5910.00	5070.00	4770.00	3310.00	2500.00	1590.00	1410.00	907.00
S-30	8570.00	5950.00	5350.00	4860.00	3750.00	2260.00	2160.00	1510.00	848.00
S-31	7190.00	5790.00	5510.00	4640.00	3210.00	2500.00	1970.00	1660.00	808.00
MEAN	5700.00	3060.00	2580.00	2250.00	1910.00	1560.00	1270.00	1030.00	839.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06207500 CLARKS FORK YELLOWSTONE RIVER NEAR BELFRY, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 49-YEAR PERIOD BETWEEN WATER YEARS 1926 AND 1974

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
6-01	8190.00	5640.00	5110.00	4450.00	3410.00	2480.00	2130.00	1770.00	824.00
6-02	8790.00	6210.00	4810.00	3980.00	3520.00	2400.00	1980.00	1650.00	1200.00
6-03	8000.00	6430.00	5100.00	4450.00	3300.00	2610.00	2020.00	1880.00	1200.00
6-04	9040.00	6130.00	5350.00	4600.00	3300.00	2520.00	2260.00	2100.00	1300.00
6-05	9370.00	6240.00	5370.00	4600.00	3250.00	2800.00	2480.00	1950.00	1180.00
6-06	8440.00	6700.00	5280.00	4810.00	3630.00	2870.00	2310.00	2040.00	1170.00
6-07	8630.00	6790.00	5610.00	4810.00	4050.00	2700.00	2340.00	1940.00	1310.00
6-08	9400.00	7000.00	5680.00	4840.00	4170.00	3090.00	2190.00	1800.00	1510.00
6-09	9500.00	6670.00	6000.00	5360.00	3880.00	2750.00	2450.00	1960.00	1380.00
6-10	8020.00	6770.00	6210.00	5600.00	3880.00	2780.00	2610.00	2200.00	1450.00
6-11	8070.00	6790.00	5760.00	5090.00	3940.00	3140.00	2670.00	2090.00	1500.00
6-12	8290.00	6950.00	5820.00	5090.00	4000.00	3200.00	2670.00	2290.00	1460.00
6-13	7880.00	7140.00	6500.00	5390.00	4250.00	3090.00	2830.00	2340.00	1590.00
6-14	8400.00	7310.00	6010.00	5380.00	4230.00	3070.00	2760.00	2200.00	1530.00
6-15	9410.00	7290.00	6750.00	5100.00	4280.00	3200.00	2890.00	2420.00	1590.00
6-16	9780.00	7040.00	6260.00	5560.00	4090.00	3360.00	2990.00	2440.00	1750.00
6-17	9940.00	7650.00	6260.00	5300.00	4230.00	3410.00	2760.00	2350.00	1750.00
6-18	10000.00	7260.00	6340.00	5060.00	4130.00	3120.00	2520.00	2090.00	1850.00
6-19	9620.00	7800.00	5870.00	5540.00	3770.00	2950.00	2620.00	2110.00	1590.00
6-20	9780.00	7770.00	5710.00	5140.00	3870.00	3090.00	2730.00	2170.00	1430.00
6-21	9660.00	7680.00	6120.00	5140.00	4050.00	3090.00	2860.00	2180.00	1450.00
6-22	9130.00	7390.00	6410.00	5300.00	3770.00	3280.00	2610.00	1940.00	1800.00
6-23	9600.00	7920.00	6650.00	5710.00	3600.00	3000.00	2600.00	2090.00	1730.00
6-24	9460.00	7730.00	7240.00	5490.00	3410.00	2970.00	2640.00	1900.00	1620.00
6-25	9440.00	7800.00	6790.00	5060.00	3690.00	2870.00	2610.00	1980.00	1620.00
6-26	8860.00	7560.00	6970.00	5100.00	3560.00	2900.00	2380.00	2110.00	1430.00
6-27	10000.00	7240.00	6650.00	5620.00	3310.00	2500.00	2220.00	2040.00	1560.00
6-28	8860.00	6720.00	5760.00	5040.00	3410.00	2500.00	2300.00	1960.00	1760.00
6-29	8010.00	6130.00	5370.00	4500.00	3520.00	2430.00	2220.00	1780.00	1580.00
6-30	7800.00	6120.00	5560.00	4320.00	3280.00	2470.00	1960.00	1570.00	1430.00
MEAN	6630.00	6030.00	5460.00	4730.00	3940.00	3360.00	3130.00	2810.00	2460.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06207500 CLARKS FORK YELLOWSTONE RIVER NEAR BELFRY, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 49-YEAR PERIOD BETWEEN WATER YEARS 1926 AND 1974

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
7-01	9130.00	5900.00	4660.00	4000.00	3050.00	2340.00	1950.00	1530.00	1200.00
7-02	7800.00	6030.00	5100.00	4360.00	3090.00	2270.00	1950.00	1340.00	810.00
7-03	7160.00	5410.00	4710.00	4050.00	3090.00	2470.00	1870.00	1340.00	770.00
7-04	6850.00	5120.00	4680.00	4050.00	3070.00	2320.00	1920.00	1380.00	720.00
7-05	6500.00	5000.00	4350.00	4040.00	2850.00	2300.00	2040.00	1380.00	679.00
7-06	6400.00	4810.00	4380.00	3950.00	2720.00	2340.00	1820.00	1280.00	640.00
7-07	6400.00	5040.00	4380.00	3800.00	2680.00	2300.00	1700.00	1180.00	567.00
7-08	6100.00	4790.00	4200.00	3540.00	2500.00	2040.00	1520.00	1260.00	532.00
7-09	6250.00	4790.00	3930.00	3510.00	2500.00	1990.00	1630.00	1190.00	471.00
7-10	6550.00	4760.00	3930.00	3540.00	2510.00	1770.00	1480.00	1090.00	444.00
7-11	6250.00	4550.00	3990.00	3230.00	2510.00	1780.00	1410.00	1100.00	418.00
7-12	5800.00	4380.00	3680.00	3260.00	2370.00	1800.00	1450.00	1010.00	418.00
7-13	4870.00	4200.00	3410.00	3170.00	2570.00	1780.00	1470.00	952.00	394.00
7-14	4620.00	4000.00	3490.00	3050.00	2330.00	1730.00	1310.00	874.00	370.00
7-15	5020.00	4090.00	3280.00	2890.00	2180.00	1730.00	1130.00	858.00	370.00
7-16	4460.00	3900.00	3260.00	2770.00	2010.00	1620.00	1040.00	812.00	348.00
7-17	4570.00	3840.00	3110.00	2680.00	1980.00	1520.00	974.00	744.00	348.00
7-18	4610.00	3440.00	2900.00	2480.00	1720.00	1300.00	958.00	695.00	326.00
7-19	4500.00	3490.00	2790.00	2410.00	1650.00	1110.00	1020.00	661.00	286.00
7-20	4460.00	3440.00	2820.00	2350.00	1640.00	1150.00	959.00	578.00	286.00
7-21	4950.00	3070.00	2610.00	2170.00	1500.00	1080.00	898.00	558.00	286.00
7-22	4200.00	2870.00	2510.00	2040.00	1440.00	1010.00	876.00	588.00	250.00
7-23	3530.00	2870.00	2340.00	1840.00	1370.00	922.00	763.00	564.00	250.00
7-24	3520.00	2680.00	2300.00	1660.00	1310.00	850.00	770.00	546.00	250.00
7-25	3410.00	2690.00	2130.00	1660.00	1230.00	850.00	766.00	524.00	250.00
7-26	3300.00	2620.00	1910.00	1620.00	1180.00	850.00	746.00	485.00	234.00
7-27	3300.00	2430.00	1790.00	1500.00	1160.00	810.00	704.00	446.00	268.00
7-28	3200.00	2220.00	1710.00	1450.00	1120.00	746.00	678.00	441.00	306.00
7-29	2990.00	2170.00	1650.00	1380.00	1040.00	700.00	668.00	430.00	285.00
7-30	2880.00	2330.00	1530.00	1220.00	1010.00	773.00	644.00	508.00	259.00
7-31	2680.00	1940.00	1480.00	1250.00	960.00	693.00	600.00	522.00	237.00
MEAN	4740.00	3870.00	3300.00	2540.00	2140.00	1580.00	1300.00	871.00	469.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06207500 CLARKS FORK YELLOWSTONE RIVER NEAR BELFRY, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 49-YEAR PERIOD BETWEEN WATER YEARS 1926 AND 1974

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
8-01	2450.00	1720.00	1550.00	1250.00	912.00	695.00	590.00	386.00	225.00
8-02	2610.00	1620.00	1410.00	1160.00	850.00	668.00	578.00	348.00	219.00
8-03	2610.00	1610.00	1380.00	1080.00	835.00	612.00	534.00	341.00	216.00
8-04	2340.00	1750.00	1340.00	1060.00	788.00	597.00	518.00	370.00	199.00
8-05	2860.00	1610.00	1340.00	1040.00	760.00	576.00	518.00	335.00	193.00
8-06	2650.00	1550.00	1240.00	992.00	739.00	560.00	470.00	335.00	182.00
8-07	2420.00	1440.00	1170.00	904.00	690.00	532.00	454.00	330.00	157.00
8-08	2100.00	1310.00	1100.00	877.00	630.00	514.00	423.00	326.00	152.00
8-09	1820.00	1330.00	1100.00	861.00	600.00	482.00	413.00	326.00	130.00
8-10	1610.00	1330.00	1020.00	852.00	580.00	478.00	416.00	335.00	120.00
8-11	1550.00	1280.00	1020.00	882.00	569.00	454.00	395.00	335.00	118.00
8-12	1910.00	1200.00	977.00	846.00	540.00	446.00	399.00	335.00	118.00
8-13	1760.00	1190.00	956.00	819.00	521.00	472.00	398.00	306.00	120.00
8-14	1590.00	1140.00	835.00	755.00	499.00	447.00	386.00	335.00	116.00
8-15	1590.00	1140.00	829.00	726.00	511.00	430.00	367.00	309.00	111.00
8-16	1460.00	1100.00	906.00	654.00	480.00	402.00	344.00	296.00	107.00
8-17	1560.00	1060.00	829.00	654.00	446.00	385.00	335.00	302.00	105.00
8-18	1260.00	993.00	758.00	630.00	441.00	368.00	318.00	285.00	107.00
8-19	1260.00	1000.00	714.00	594.00	449.00	344.00	320.00	272.00	109.00
8-20	1370.00	1070.00	870.00	600.00	480.00	335.00	306.00	256.00	107.00
8-21	2080.00	1000.00	775.00	575.00	445.00	335.00	288.00	250.00	111.00
8-22	2550.00	1040.00	820.00	557.00	435.00	326.00	275.00	240.00	116.00
8-23	2460.00	974.00	813.00	522.00	422.00	316.00	265.00	250.00	116.00
8-24	2070.00	956.00	755.00	496.00	390.00	302.00	263.00	234.00	120.00
8-25	1580.00	995.00	675.00	488.00	362.00	288.00	251.00	210.00	148.00
8-26	1250.00	886.00	674.00	474.00	341.00	275.00	256.00	189.00	145.00
8-27	1200.00	819.00	681.00	485.00	335.00	276.00	233.00	189.00	150.00
8-28	1100.00	775.00	649.00	484.00	335.00	282.00	237.00	189.00	134.00
8-29	1120.00	870.00	637.00	483.00	340.00	250.00	225.00	181.00	130.00
8-30	957.00	785.00	636.00	490.00	340.00	240.00	216.00	168.00	128.00
8-31	955.00	819.00	612.00	521.00	347.00	256.00	218.00	170.00	118.00
MEAN	1450.00	1140.00	1020.00	730.00	530.00	423.00	385.00	309.00	142.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06207500 CLARKS FORK YELLOWSTONE RIVER NEAR BELFRY, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 49-YEAR PERIOD BETWEEN WATER YEARS 1926 AND 1974

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
9-01	984.00	827.00	606.00	455.00	331.00	250.00	218.00	165.00	116.00
9-02	939.00	740.00	594.00	455.00	318.00	255.00	222.00	168.00	105.00
9-03	1130.00	781.00	565.00	445.00	330.00	248.00	218.00	165.00	102.00
9-04	1170.00	643.00	495.00	445.00	328.00	249.00	214.00	169.00	102.00
9-05	956.00	631.00	508.00	436.00	315.00	225.00	204.00	182.00	103.00
9-06	873.00	612.00	495.00	416.00	326.00	217.00	196.00	189.00	105.00
9-07	1190.00	746.00	472.00	398.00	305.00	208.00	193.00	179.00	107.00
9-08	920.00	693.00	559.00	406.00	303.00	210.00	186.00	169.00	105.00
9-09	1080.00	733.00	554.00	389.00	333.00	210.00	179.00	158.00	111.00
9-10	1030.00	796.00	494.00	400.00	320.00	225.00	179.00	155.00	128.00
9-11	1140.00	635.00	455.00	376.00	321.00	234.00	176.00	151.00	119.00
9-12	1010.00	636.00	469.00	416.00	316.00	235.00	179.00	148.00	96.00
9-13	948.00	618.00	455.00	395.00	314.00	225.00	177.00	154.00	96.00
9-14	882.00	556.00	416.00	395.00	300.00	219.00	179.00	145.00	93.00
9-15	827.00	604.00	461.00	371.00	306.00	235.00	179.00	138.00	90.00
9-16	822.00	672.00	472.00	384.00	296.00	243.00	179.00	145.00	88.00
9-17	788.00	660.00	428.00	368.00	281.00	232.00	179.00	141.00	88.00
9-18	776.00	618.00	435.00	357.00	285.00	225.00	179.00	136.00	86.00
9-19	1660.00	600.00	417.00	384.00	288.00	224.00	178.00	134.00	80.00
9-20	918.00	518.00	407.00	368.00	280.00	218.00	181.00	138.00	78.00
9-21	837.00	609.00	429.00	386.00	275.00	219.00	195.00	145.00	80.00
9-22	796.00	604.00	411.00	378.00	285.00	222.00	201.00	148.00	78.00
9-23	746.00	587.00	417.00	357.00	263.00	218.00	198.00	152.00	83.00
9-24	812.00	554.00	439.00	336.00	262.00	207.00	192.00	163.00	83.00
9-25	788.00	587.00	441.00	323.00	249.00	205.00	189.00	159.00	61.00
9-26	804.00	559.00	429.00	318.00	269.00	206.00	189.00	164.00	63.00
9-27	1060.00	526.00	430.00	328.00	266.00	204.00	186.00	162.00	67.00
9-28	1090.00	558.00	446.00	321.00	266.00	204.00	179.00	152.00	67.00
9-29	1040.00	549.00	450.00	348.00	258.00	202.00	191.00	154.00	65.00
9-30	1030.00	546.00	455.00	366.00	259.00	200.00	178.00	159.00	63.00
MEAN	834.00	553.00	476.00	387.00	309.00	240.00	195.00	173.00	104.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06207500 CLARKS FORK YELLOWSTONE RIVER NEAR BELFRY, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 49-YEAR PERIOD BETWEEN WATER YEARS 1926 AND 1974

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
10-01	949.00	531.00	423.00	399.00	275.00	191.00	182.00	135.00	63.00
10-02	1000.00	485.00	416.00	370.00	272.00	196.00	180.00	132.00	61.00
10-03	901.00	480.00	400.00	378.00	259.00	197.00	185.00	135.00	59.00
10-04	885.00	502.00	416.00	388.00	268.00	199.00	180.00	135.00	56.00
10-05	893.00	474.00	416.00	388.00	262.00	202.00	175.00	135.00	54.00
10-06	871.00	535.00	412.00	382.00	268.00	200.00	177.00	135.00	52.00
10-07	822.00	538.00	425.00	382.00	268.00	204.00	179.00	132.00	52.00
10-08	1760.00	532.00	405.00	371.00	267.00	189.00	172.00	132.00	52.00
10-09	1320.00	522.00	400.00	359.00	271.00	204.00	170.00	126.00	61.00
10-10	1200.00	519.00	400.00	356.00	269.00	210.00	171.00	123.00	65.00
10-11	1260.00	510.00	408.00	346.00	269.00	206.00	171.00	117.00	65.00
10-12	1260.00	499.00	400.00	353.00	263.00	204.00	172.00	103.00	72.00
10-13	1260.00	485.00	411.00	361.00	268.00	208.00	168.00	107.00	69.00
10-14	1260.00	546.00	400.00	344.00	265.00	209.00	175.00	104.00	72.00
10-15	1200.00	542.00	400.00	344.00	268.00	208.00	165.00	108.00	69.00
10-16	866.00	551.00	405.00	378.00	277.00	208.00	165.00	103.00	65.00
10-17	835.00	531.00	416.00	372.00	275.00	216.00	160.00	135.00	66.00
10-18	791.00	518.00	403.00	364.00	277.00	209.00	159.00	126.00	54.00
10-19	741.00	490.00	400.00	367.00	273.00	212.00	156.00	116.00	50.00
10-20	687.00	479.00	400.00	353.00	283.00	208.00	153.00	122.00	52.00
10-21	648.00	469.00	411.00	355.00	281.00	218.00	172.00	133.00	54.00
10-22	617.00	456.00	400.00	347.00	279.00	204.00	168.00	130.00	56.00
10-23	607.00	457.00	400.00	353.00	275.00	204.00	150.00	132.00	58.00
10-24	586.00	518.00	408.00	318.00	278.00	196.00	150.00	133.00	60.00
10-25	581.00	496.00	400.00	337.00	262.00	196.00	159.00	133.00	54.00
10-26	675.00	496.00	400.00	337.00	268.00	196.00	169.00	127.00	54.00
10-27	595.00	479.00	400.00	324.00	280.00	190.00	175.00	130.00	56.00
10-28	558.00	462.00	395.00	326.00	265.00	200.00	165.00	132.00	56.00
10-29	558.00	465.00	386.00	326.00	259.00	204.00	175.00	136.00	54.00
10-30	522.00	471.00	375.00	343.00	251.00	196.00	165.00	135.00	54.00
10-31	496.00	443.00	364.00	323.00	255.00	193.00	179.00	142.00	48.00
MEAN	725.00	510.00	400.00	327.00	275.00	217.00	176.00	122.00	62.10

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06207500 CLARKS FORK YELLOWSTONE RIVER NEAR BELFRY, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 49-YEAR PERIOD BETWEEN WATER YEARS 1926 AND 1974

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
11-01	546.00	455.00	364.00	344.00	263.00	204.00	176.00	145.00	48.00
11-02	529.00	476.00	363.00	346.00	244.00	204.00	168.00	145.00	50.00
11-03	505.00	443.00	357.00	330.00	253.00	204.00	168.00	150.00	50.00
11-04	494.00	485.00	368.00	325.00	256.00	218.00	200.00	158.00	63.00
11-05	600.00	485.00	371.00	350.00	269.00	213.00	197.00	152.00	93.00
11-06	730.00	441.00	386.00	348.00	285.00	210.00	187.00	165.00	88.00
11-07	730.00	447.00	395.00	350.00	282.00	209.00	186.00	172.00	142.00
11-08	775.00	446.00	393.00	350.00	278.00	214.00	195.00	176.00	128.00
11-09	730.00	441.00	417.00	350.00	269.00	218.00	195.00	175.00	154.00
11-10	870.00	430.00	385.00	350.00	279.00	230.00	200.00	172.00	150.00
11-11	822.00	424.00	383.00	341.00	286.00	247.00	200.00	182.00	128.00
11-12	775.00	425.00	391.00	341.00	284.00	248.00	198.00	179.00	118.00
11-13	775.00	428.00	400.00	350.00	306.00	255.00	214.00	180.00	107.00
11-14	822.00	433.00	384.00	350.00	302.00	259.00	204.00	189.00	134.00
11-15	775.00	428.00	391.00	350.00	297.00	255.00	210.00	193.00	145.00
11-16	730.00	422.00	378.00	350.00	296.00	264.00	230.00	200.00	126.00
11-17	685.00	416.00	374.00	350.00	293.00	256.00	230.00	201.00	118.00
11-18	680.00	412.00	378.00	346.00	292.00	260.00	215.00	197.00	114.00
11-19	642.00	444.00	384.00	350.00	302.00	247.00	222.00	201.00	120.00
11-20	685.00	435.00	404.00	361.00	295.00	260.00	216.00	196.00	138.00
11-21	685.00	417.00	378.00	336.00	306.00	272.00	263.00	200.00	141.00
11-22	600.00	395.00	375.00	350.00	295.00	266.00	243.00	228.00	150.00
11-23	518.00	420.00	380.00	357.00	299.00	264.00	244.00	207.00	150.00
11-24	600.00	424.00	378.00	358.00	320.00	272.00	261.00	220.00	150.00
11-25	544.00	437.00	395.00	378.00	323.00	272.00	250.00	220.00	150.00
11-26	600.00	436.00	378.00	368.00	317.00	275.00	252.00	222.00	150.00
11-27	642.00	402.00	388.00	340.00	292.00	256.00	240.00	208.00	150.00
11-28	600.00	395.00	379.00	343.00	292.00	265.00	230.00	214.00	150.00
11-29	600.00	396.00	372.00	352.00	300.00	260.00	240.00	208.00	146.00
11-30	600.00	402.00	368.00	359.00	311.00	262.00	235.00	196.00	150.00
MEAN	648.00	413.00	380.00	349.00	285.00	248.00	225.00	200.00	150.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06207500 CLARKS FORK YELLOWSTONE RIVER NEAR BELFRY, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 49-YEAR PERIOD BETWEEN WATER YEARS 1926 AND 1974

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
12-01	480.00	398.00	368.00	340.00	300.00	265.00	224.00	200.00	170.00
12-02	450.00	380.00	357.00	340.00	300.00	264.00	243.00	200.00	170.00
12-03	430.00	366.00	346.00	332.00	300.00	253.00	230.00	200.00	170.00
12-04	444.00	371.00	338.00	323.00	299.00	250.00	219.00	190.00	170.00
12-05	443.00	364.00	338.00	309.00	289.00	252.00	225.00	200.00	137.00
12-06	385.00	359.00	330.00	300.00	290.00	249.00	232.00	192.00	140.00
12-07	416.00	361.00	326.00	302.00	284.00	250.00	240.00	180.00	140.00
12-08	380.00	347.00	323.00	310.00	271.00	240.00	207.00	180.00	140.00
12-09	420.00	342.00	316.00	300.00	259.00	230.00	200.00	184.00	140.00
12-10	445.00	346.00	320.00	300.00	255.00	222.00	200.00	197.00	140.00
12-11	454.00	357.00	335.00	301.00	260.00	230.00	205.00	182.00	110.00
12-12	437.00	341.00	331.00	303.00	260.00	220.00	200.00	175.00	110.00
12-13	410.00	344.00	310.00	299.00	259.00	215.00	194.00	150.00	95.00
12-14	381.00	344.00	300.00	290.00	267.00	220.00	200.00	170.00	86.00
12-15	387.00	328.00	306.00	298.00	260.00	210.00	200.00	175.00	99.00
12-16	410.00	341.00	316.00	300.00	251.00	214.00	190.00	171.00	128.00
12-17	388.00	359.00	325.00	300.00	249.00	218.00	190.00	163.00	130.00
12-18	377.00	345.00	306.00	292.00	259.00	215.00	199.00	175.00	100.00
12-19	374.00	352.00	302.00	284.00	260.00	240.00	200.00	172.00	100.00
12-20	420.00	346.00	310.00	292.00	257.00	240.00	200.00	170.00	125.00
12-21	460.00	350.00	310.00	292.00	255.00	230.00	200.00	180.00	133.00
12-22	504.00	350.00	318.00	292.00	253.00	237.00	200.00	176.00	144.00
12-23	631.00	360.00	300.00	285.00	240.00	217.00	200.00	173.00	150.00
12-24	598.00	345.00	311.00	292.00	242.00	210.00	200.00	170.00	150.00
12-25	472.00	340.00	311.00	290.00	240.00	200.00	197.00	170.00	150.00
12-26	438.00	321.00	300.00	290.00	245.00	200.00	195.00	168.00	120.00
12-27	455.00	314.00	284.00	270.00	230.00	200.00	177.00	165.00	107.00
12-28	477.00	326.00	300.00	280.00	235.00	195.00	175.00	150.00	100.00
12-29	450.00	346.00	300.00	288.00	236.00	188.00	171.00	150.00	100.00
12-30	440.00	336.00	302.00	290.00	225.00	193.00	174.00	157.00	100.00
12-31	422.00	310.00	300.00	282.00	244.00	202.00	174.00	151.00	120.00
MEAN	379.00	323.00	310.00	295.00	261.00	238.00	229.00	180.00	149.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06208500 CLARKS FORK YELLOWSTONE RIVER AT EDGAR, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 39-YEAR PERIOD BETWEEN WATER YEARS 1931 AND 1969

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
1-01	600.00	480.00	460.00	440.00	382.00	340.00	300.00	250.00	196.00
1-02	680.00	460.00	430.00	410.00	390.00	350.00	300.00	250.00	180.00
1-03	620.00	480.00	448.00	420.00	380.00	340.00	300.00	250.00	208.00
1-04	540.00	500.00	470.00	430.00	380.00	350.00	300.00	262.00	250.00
1-05	550.00	500.00	450.00	420.00	390.00	340.00	320.00	260.00	215.00
1-06	550.00	500.00	450.00	410.00	380.00	355.00	330.00	260.00	177.00
1-07	570.00	470.00	450.00	420.00	400.00	355.00	325.00	270.00	169.00
1-08	620.00	480.00	430.00	420.00	400.00	355.00	300.00	260.00	191.00
1-09	530.00	480.00	450.00	421.00	395.00	350.00	300.00	250.00	191.00
1-10	525.00	490.00	450.00	430.00	390.00	340.00	300.00	250.00	208.00
1-11	516.00	480.00	450.00	430.00	400.00	347.00	300.00	230.00	202.00
1-12	516.00	480.00	430.00	420.00	400.00	340.00	300.00	230.00	200.00
1-13	510.00	450.00	440.00	420.00	376.00	330.00	300.00	230.00	222.00
1-14	510.00	460.00	430.00	410.00	380.00	310.00	280.00	250.00	215.00
1-15	530.00	450.00	430.00	420.00	375.00	310.00	290.00	250.00	202.00
1-16	540.00	460.00	410.00	400.00	330.00	290.00	260.00	250.00	180.00
1-17	520.00	460.00	420.00	400.00	340.00	300.00	280.00	240.00	180.00
1-18	520.00	490.00	410.00	390.00	350.00	290.00	280.00	225.00	180.00
1-19	540.00	480.00	420.00	400.00	350.00	280.00	270.00	231.00	180.00
1-20	550.00	480.00	410.00	375.00	340.00	290.00	260.00	220.00	180.00
1-21	540.00	480.00	410.00	375.00	330.00	300.00	280.00	210.00	150.00
1-22	520.00	450.00	410.00	400.00	340.00	302.00	290.00	230.00	150.00
1-23	510.00	460.00	410.00	390.00	360.00	320.00	290.00	250.00	150.00
1-24	490.00	440.00	416.00	400.00	380.00	300.00	290.00	250.00	150.00
1-25	480.00	440.00	420.00	407.00	360.00	310.00	280.00	250.00	150.00
1-26	480.00	430.00	420.00	400.00	360.00	300.00	290.00	250.00	230.00
1-27	500.00	450.00	420.00	400.00	360.00	330.00	300.00	250.00	230.00
1-28	550.00	430.00	420.00	390.00	360.00	320.00	300.00	250.00	230.00
1-29	530.00	460.00	410.00	390.00	360.00	320.00	300.00	240.00	228.00
1-30	520.00	440.00	412.00	400.00	360.00	310.00	300.00	250.00	201.00
1-31	540.00	435.00	420.00	400.00	360.00	300.00	279.00	250.00	178.00
MEAN	471.00	455.00	419.00	392.00	374.00	333.00	315.00	278.00	218.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06208500 CLARKS FORK YELLOWSTONE RIVER AT EDGAR, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 39-YEAR PERIOD BETWEEN WATER YEARS 1931 AND 1969

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
2-01	550.00	440.00	420.00	398.00	360.00	320.00	290.00	235.00	200.00
2-02	570.00	460.00	414.00	397.00	360.00	340.00	290.00	250.00	230.00
2-03	700.00	460.00	440.00	389.00	360.00	340.00	290.00	250.00	230.00
2-04	900.00	480.00	412.00	397.00	370.00	330.00	290.00	260.00	230.00
2-05	1500.00	510.00	414.00	397.00	360.00	330.00	310.00	270.00	230.00
2-06	1000.00	500.00	400.00	380.00	354.00	340.00	298.00	250.00	230.00
2-07	850.00	480.00	400.00	380.00	360.00	325.00	310.00	235.00	191.00
2-08	700.00	470.00	400.00	390.00	360.00	325.00	300.00	235.00	180.00
2-09	640.00	450.00	390.00	380.00	351.00	320.00	293.00	235.00	160.00
2-10	600.00	430.00	390.00	380.00	350.00	320.00	280.00	230.00	190.00
2-11	620.00	479.00	400.00	390.00	353.00	320.00	275.00	238.00	220.00
2-12	590.00	490.00	400.00	391.00	360.00	316.00	290.00	240.00	229.00
2-13	800.00	550.00	420.00	400.00	350.00	310.00	293.00	250.00	229.00
2-14	700.00	530.00	425.00	410.00	340.00	300.00	290.00	250.00	235.00
2-15	760.00	530.00	425.00	380.00	340.00	300.00	280.00	250.00	228.00
2-16	800.00	520.00	440.00	390.00	336.00	310.00	280.00	260.00	240.00
2-17	860.00	500.00	430.00	390.00	354.00	320.00	296.00	252.00	240.00
2-18	520.00	460.00	430.00	397.00	370.00	320.00	300.00	252.00	240.00
2-19	500.00	479.00	440.00	390.00	370.00	314.00	300.00	277.00	240.00
2-20	500.00	470.00	430.00	400.00	370.00	322.00	303.00	250.00	240.00
2-21	511.00	475.00	440.00	390.00	360.00	325.00	310.00	300.00	230.00
2-22	480.00	450.00	432.00	400.00	354.00	325.00	303.00	290.00	230.00
2-23	610.00	460.00	420.00	400.00	354.00	325.00	300.00	277.00	200.00
2-24	600.00	480.00	410.00	390.00	360.00	320.00	280.00	250.00	179.00
2-25	800.00	500.00	420.00	400.00	360.00	311.00	262.00	240.00	208.00
2-26	850.00	500.00	440.00	410.00	360.00	310.00	288.00	250.00	198.00
2-27	820.00	540.00	440.00	410.00	360.00	320.00	300.00	240.00	200.00
2-28	800.00	506.00	460.00	415.00	364.00	320.00	297.00	262.00	225.00
MEAN	584.00	483.00	411.00	400.00	362.00	327.00	303.00	287.00	250.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06208500 CLARKS FORK YELLOWSTONE RIVER AT EDGAR, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 39-YEAR PERIOD BETWEEN WATER YEARS 1931 AND 1969

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
3-01	760.00	511.00	470.00	440.00	348.00	318.00	290.00	280.00	250.00
3-02	640.00	470.00	440.00	424.00	350.00	310.00	300.00	270.00	190.00
3-03	640.00	460.00	420.00	387.00	340.00	310.00	300.00	250.00	230.00
3-04	640.00	445.00	420.00	395.00	340.00	314.00	300.00	250.00	210.00
3-05	540.00	460.00	410.00	385.00	336.00	316.00	300.00	260.00	210.00
3-06	640.00	460.00	420.00	400.00	340.00	300.00	275.00	262.00	220.00
3-07	714.00	450.00	410.00	396.00	335.00	310.00	300.00	262.00	220.00
3-08	795.00	450.00	430.00	400.00	350.00	330.00	300.00	262.00	250.00
3-09	714.00	471.00	440.00	400.00	370.00	330.00	290.00	260.00	240.00
3-10	714.00	472.00	432.00	400.00	372.00	324.00	300.00	262.00	220.00
3-11	795.00	500.00	445.00	411.00	370.00	330.00	308.00	262.00	186.00
3-12	602.00	500.00	448.00	401.00	363.00	330.00	300.00	260.00	240.00
3-13	680.00	475.00	440.00	410.00	364.00	330.00	303.00	260.00	225.00
3-14	740.00	480.00	421.00	400.00	360.00	324.00	300.00	260.00	197.00
3-15	660.00	500.00	440.00	402.00	360.00	324.00	302.00	260.00	240.00
3-16	1090.00	520.00	460.00	406.00	368.00	330.00	302.00	260.00	220.00
3-17	2370.00	520.00	460.00	396.00	369.00	330.00	304.00	264.00	222.00
3-18	1000.00	500.00	440.00	408.00	366.00	330.00	316.00	269.00	182.00
3-19	900.00	500.00	450.00	395.00	347.00	328.00	318.00	288.00	160.00
3-20	942.00	520.00	415.00	388.00	338.00	318.00	290.00	275.00	180.00
3-21	716.00	550.00	404.00	376.00	332.00	312.00	296.00	279.00	190.00
3-22	600.00	540.00	384.00	381.00	354.00	308.00	290.00	275.00	200.00
3-23	700.00	595.00	434.00	396.00	351.00	316.00	290.00	261.00	180.00
3-24	1500.00	625.00	495.00	407.00	342.00	315.00	279.00	266.00	150.00
3-25	2170.00	558.00	448.00	384.00	356.00	302.00	288.00	255.00	140.00
3-26	1210.00	589.00	405.00	378.00	347.00	330.00	297.00	276.00	140.00
3-27	655.00	630.00	405.00	370.00	351.00	320.00	300.00	270.00	140.00
3-28	840.00	516.00	448.00	370.00	354.00	316.00	284.00	262.00	150.00
3-29	1160.00	494.00	440.00	387.00	348.00	316.00	296.00	276.00	170.00
3-30	1160.00	495.00	419.00	400.00	354.00	320.00	296.00	275.00	231.00
3-31	805.00	489.00	458.00	423.00	355.00	334.00	315.00	276.00	222.00
MEAN	554.00	498.00	425.00	404.00	367.00	331.00	319.00	298.00	259.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06208500 CLARKS FORK YELLOWSTONE RIVER AT EDGAR, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 39-YEAR PERIOD BETWEEN WATER YEARS 1931 AND 1969

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
4-01	892.00	489.00	448.00	405.00	362.00	339.00	318.00	278.00	200.00
4-02	951.00	480.00	445.00	412.00	364.00	338.00	330.00	276.00	200.00
4-03	765.00	448.00	429.00	411.00	387.00	339.00	312.00	266.00	200.00
4-04	770.00	488.00	445.00	408.00	383.00	324.00	308.00	266.00	200.00
4-05	875.00	530.00	446.00	405.00	367.00	332.00	308.00	275.00	200.00
4-06	805.00	510.00	472.00	435.00	378.00	333.00	308.00	275.00	251.00
4-07	875.00	560.00	465.00	420.00	370.00	329.00	303.00	288.00	198.00
4-08	950.00	625.00	453.00	423.00	374.00	340.00	318.00	288.00	170.00
4-09	1030.00	615.00	476.00	430.00	376.00	354.00	335.00	276.00	150.00
4-10	1070.00	565.00	498.00	440.00	385.00	348.00	336.00	296.00	145.00
4-11	1210.00	555.00	512.00	440.00	368.00	339.00	330.00	316.00	134.00
4-12	1070.00	690.00	507.00	428.00	374.00	347.00	328.00	308.00	97.00
4-13	1120.00	700.00	502.00	437.00	371.00	348.00	321.00	308.00	70.00
4-14	1260.00	696.00	526.00	462.00	397.00	340.00	316.00	303.00	58.00
4-15	1260.00	672.00	620.00	520.00	421.00	359.00	340.00	307.00	66.00
4-16	1680.00	714.00	631.00	570.00	448.00	374.00	340.00	320.00	64.00
4-17	1800.00	744.00	630.00	566.00	472.00	384.00	374.00	330.00	56.00
4-18	1800.00	813.00	680.00	600.00	495.00	391.00	359.00	315.00	45.00
4-19	1800.00	1060.00	710.00	679.00	526.00	364.00	345.00	314.00	40.00
4-20	2170.00	1190.00	766.00	631.00	475.00	384.00	348.00	300.00	40.00
4-21	2170.00	1140.00	812.00	648.00	465.00	395.00	340.00	300.00	40.00
4-22	2170.00	1240.00	890.00	695.00	500.00	398.00	376.00	310.00	38.00
4-23	1920.00	1540.00	873.00	759.00	590.00	403.00	370.00	300.00	45.00
4-24	1840.00	1450.00	920.00	753.00	627.00	424.00	352.00	300.00	53.00
4-25	2040.00	1720.00	1020.00	644.00	530.00	432.00	352.00	300.00	78.00
4-26	2910.00	1970.00	1210.00	861.00	488.00	407.00	348.00	296.00	114.00
4-27	2380.00	1800.00	1060.00	759.00	530.00	409.00	348.00	279.00	119.00
4-28	2380.00	1570.00	1140.00	755.00	615.00	420.00	388.00	270.00	101.00
4-29	2440.00	1510.00	1280.00	779.00	602.00	470.00	381.00	300.00	82.00
4-30	2380.00	1700.00	1040.00	800.00	664.00	444.00	400.00	300.00	72.00
MEAN	1400.00	874.00	681.00	595.00	471.00	420.00	371.00	353.00	123.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06208500 CLARKS FORK YELLOWSTONE RIVER AT EDGAR, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 39-YEAR PERIOD BETWEEN WATER YEARS 1931 AND 1969

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
S-01	2430.00	1830.00	1080.00	968.00	664.00	485.00	383.00	362.00	63.00
S-02	2570.00	1680.00	1000.00	907.00	640.00	515.00	445.00	391.00	55.00
S-03	2730.00	1700.00	1090.00	974.00	680.00	544.00	474.00	404.00	54.00
S-04	3590.00	2170.00	1150.00	1000.00	692.00	544.00	482.00	424.00	53.00
S-05	3480.00	2300.00	1390.00	1090.00	738.00	610.00	472.00	370.00	60.00
S-06	3130.00	2720.00	1690.00	1120.00	899.00	610.00	510.00	376.00	55.00
S-07	4130.00	2290.00	1800.00	1430.00	905.00	610.00	488.00	380.00	54.00
S-08	4130.00	2240.00	1680.00	1380.00	912.00	584.00	530.00	412.00	49.00
S-09	4430.00	2360.00	1770.00	1490.00	1010.00	642.00	530.00	418.00	44.00
S-10	4930.00	2650.00	1780.00	1670.00	1160.00	663.00	500.00	364.00	43.00
S-11	3800.00	2580.00	2030.00	1770.00	1380.00	807.00	631.00	362.00	37.00
S-12	3800.00	2720.00	2480.00	1990.00	1460.00	828.00	580.00	368.00	78.00
S-13	3700.00	3130.00	2590.00	2040.00	1360.00	747.00	631.00	394.00	170.00
S-14	4140.00	3180.00	2720.00	2100.00	1390.00	950.00	642.00	514.00	134.00
S-15	5120.00	3320.00	2470.00	2250.00	1440.00	1000.00	760.00	530.00	242.00
S-16	5750.00	3070.00	2710.00	2440.00	1500.00	1090.00	928.00	592.00	430.00
S-17	4740.00	3490.00	2780.00	2430.00	1490.00	1120.00	975.00	662.00	498.00
S-18	4790.00	3770.00	3130.00	2580.00	1840.00	1030.00	950.00	829.00	514.00
S-19	4730.00	3750.00	3060.00	2640.00	1940.00	1160.00	1060.00	852.00	450.00
S-20	5160.00	3640.00	3260.00	3050.00	2000.00	1170.00	1000.00	858.00	436.00
S-21	6060.00	3800.00	3490.00	3010.00	2160.00	1090.00	1000.00	845.00	474.00
S-22	6530.00	5240.00	3500.00	2720.00	2160.00	1360.00	1020.00	870.00	510.00
S-23	5980.00	5160.00	3280.00	2710.00	2370.00	1910.00	1430.00	858.00	596.00
S-24	6000.00	4640.00	3480.00	3130.00	2470.00	1920.00	1640.00	1000.00	658.00
S-25	6400.00	5120.00	3710.00	3210.00	2640.00	1980.00	1460.00	1000.00	560.00
S-26	6510.00	5290.00	3970.00	3750.00	2690.00	1930.00	1430.00	971.00	412.00
S-27	6700.00	5000.00	4450.00	4090.00	2870.00	1990.00	1570.00	1000.00	407.00
S-28	6860.00	5420.00	4450.00	4090.00	2960.00	2400.00	1530.00	1000.00	819.00
S-29	7910.00	5750.00	5300.00	4680.00	3130.00	2310.00	1750.00	1260.00	864.00
S-30	7560.00	5970.00	5300.00	5000.00	3580.00	2110.00	1970.00	1560.00	780.00
S-31	7360.00	6060.00	5290.00	4960.00	3130.00	2190.00	2090.00	1760.00	798.00
MEAN	3210.00	2980.00	2660.00	2450.00	1930.00	1540.00	1180.00	1000.00	757.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06208500 CLARKS FORK YELLOWSTONE RIVER AT EDGAR, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 39-YEAR PERIOD BETWEEN WATER YEARS 1931 AND 1969

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
6-01	7820.00	6020.00	5460.00	4710.00	3170.00	2570.00	2130.00	1990.00	712.00
6-02	10600.00	6480.00	5020.00	4270.00	3170.00	2500.00	2250.00	1860.00	756.00
6-03	8730.00	7040.00	4830.00	4270.00	3260.00	2430.00	2090.00	1750.00	1280.00
6-04	8810.00	6350.00	5380.00	4980.00	3380.00	2710.00	2250.00	2010.00	1240.00
6-05	9300.00	6650.00	5510.00	4350.00	3470.00	2850.00	2640.00	2030.00	1510.00
6-06	9030.00	6960.00	5500.00	4860.00	3740.00	3050.00	2500.00	2340.00	1620.00
6-07	8700.00	6350.00	5500.00	5100.00	4160.00	2880.00	2430.00	2240.00	1590.00
6-08	8070.00	7280.00	5700.00	5330.00	4380.00	3340.00	2370.00	2170.00	1770.00
6-09	7800.00	6920.00	5890.00	5500.00	4050.00	3020.00	2300.00	2160.00	1540.00
6-10	8000.00	6810.00	5960.00	5190.00	3800.00	2940.00	2700.00	2050.00	1450.00
6-11	7410.00	6630.00	5740.00	4920.00	3630.00	2960.00	2580.00	2290.00	1550.00
6-12	7100.00	6620.00	5840.00	5230.00	3630.00	3250.00	2780.00	2250.00	1490.00
6-13	7600.00	6740.00	5820.00	4930.00	3950.00	3130.00	2980.00	2370.00	1530.00
6-14	8450.00	7100.00	6030.00	5440.00	4180.00	3060.00	2980.00	2500.00	1680.00
6-15	8770.00	7700.00	5500.00	4720.00	4270.00	3580.00	2980.00	2710.00	1520.00
6-16	9230.00	7600.00	5950.00	5100.00	4430.00	3570.00	3300.00	2380.00	1670.00
6-17	8680.00	6880.00	6420.00	5500.00	4450.00	3800.00	2980.00	2640.00	1870.00
6-18	8680.00	7190.00	5720.00	4800.00	4370.00	3640.00	2920.00	2300.00	2050.00
6-19	8620.00	7340.00	5990.00	5300.00	3950.00	3410.00	2700.00	2300.00	1850.00
6-20	8770.00	7170.00	5650.00	5100.00	3780.00	3380.00	3110.00	2520.00	1890.00
6-21	8770.00	7200.00	5880.00	5190.00	3890.00	3410.00	3050.00	2540.00	1700.00
6-22	8770.00	7000.00	5960.00	5220.00	4190.00	3230.00	3110.00	2410.00	1700.00
6-23	9790.00	7430.00	6570.00	5720.00	3850.00	3230.00	2940.00	2160.00	1580.00
6-24	8200.00	7560.00	6400.00	5910.00	3650.00	2990.00	2710.00	2040.00	1580.00
6-25	7830.00	7320.00	5950.00	5460.00	4090.00	2960.00	2820.00	2150.00	1470.00
6-26	7970.00	7220.00	5950.00	5460.00	3300.00	2920.00	2560.00	2160.00	1360.00
6-27	8370.00	7790.00	6350.00	5500.00	3560.00	2710.00	2300.00	2110.00	1300.00
6-28	7380.00	7030.00	5960.00	5190.00	3370.00	2530.00	2280.00	1880.00	1470.00
6-29	7340.00	5740.00	5380.00	4850.00	2920.00	2400.00	2340.00	1680.00	1360.00
6-30	7800.00	6190.00	4700.00	4080.00	2710.00	2370.00	2140.00	1480.00	1150.00
MEAN	6380.00	5860.00	5040.00	4770.00	4080.00	3420.00	3280.00	2870.00	2620.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06208500 CLARKS FORK YELLOWSTONE RIVER AT EDGAR, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 39-YEAR PERIOD BETWEEN WATER YEARS 1931 AND 1969

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
7-01	8970.00	6350.00	4330.00	3810.00	2750.00	2240.00	1660.00	1220.00	900.00
7-02	8170.00	6220.00	4250.00	3820.00	2800.00	2050.00	1340.00	1060.00	785.00
7-03	7170.00	5880.00	4230.00	3730.00	2850.00	2150.00	1370.00	1000.00	706.00
7-04	7170.00	5360.00	4150.00	3950.00	2690.00	2030.00	1320.00	1130.00	785.00
7-05	6790.00	4990.00	4460.00	3850.00	2750.00	2120.00	1600.00	1190.00	706.00
7-06	6600.00	4810.00	4330.00	3690.00	2570.00	1990.00	1640.00	1050.00	631.00
7-07	6600.00	4770.00	4150.00	3530.00	2520.00	2120.00	1490.00	962.00	459.00
7-08	6220.00	4920.00	3930.00	3590.00	2510.00	1910.00	1280.00	900.00	414.00
7-09	6220.00	4920.00	3690.00	3230.00	2380.00	1570.00	1140.00	900.00	314.00
7-10	6410.00	4740.00	3650.00	3180.00	2380.00	1390.00	1060.00	900.00	251.00
7-11	6220.00	4750.00	3570.00	2990.00	2260.00	1350.00	974.00	885.00	203.00
7-12	5650.00	4320.00	3490.00	2820.00	2380.00	1410.00	1010.00	631.00	210.00
7-13	5090.00	3970.00	3320.00	2920.00	2160.00	1490.00	948.00	744.00	195.00
7-14	4570.00	3810.00	2970.00	2780.00	2220.00	1460.00	900.00	717.00	143.00
7-15	4570.00	3900.00	3140.00	2650.00	2070.00	1420.00	927.00	627.00	112.00
7-16	5100.00	3810.00	2990.00	2500.00	2120.00	1400.00	900.00	560.00	118.00
7-17	4380.00	3680.00	2960.00	2510.00	1860.00	1320.00	892.00	530.00	95.00
7-18	4300.00	3180.00	2640.00	2400.00	1710.00	1200.00	813.00	440.00	74.00
7-19	4300.00	3320.00	2560.00	2170.00	1550.00	1020.00	774.00	384.00	74.00
7-20	4230.00	3030.00	2400.00	2260.00	1570.00	900.00	700.00	356.00	84.00
7-21	4810.00	2870.00	2250.00	2120.00	1380.00	936.00	645.00	346.00	62.00
7-22	4330.00	2720.00	2250.00	1920.00	1170.00	900.00	644.00	340.00	55.00
7-23	3510.00	2570.00	2110.00	1670.00	1080.00	808.00	620.00	328.00	77.00
7-24	3510.00	2350.00	2090.00	1660.00	1080.00	774.00	538.00	348.00	53.00
7-25	3510.00	2180.00	1860.00	1440.00	1040.00	778.00	635.00	391.00	43.00
7-26	3340.00	2080.00	1650.00	1390.00	1060.00	901.00	590.00	360.00	64.00
7-27	3180.00	1960.00	1620.00	1360.00	1070.00	875.00	602.00	396.00	188.00
7-28	3340.00	1840.00	1500.00	1280.00	980.00	812.00	548.00	290.00	180.00
7-29	3020.00	1980.00	1520.00	1190.00	970.00	767.00	536.00	277.00	218.00
7-30	2870.00	1750.00	1410.00	1120.00	900.00	744.00	528.00	305.00	216.00
7-31	2580.00	1640.00	1410.00	1090.00	901.00	706.00	596.00	404.00	204.00
MEAN	4770.00	3690.00	2930.00	2460.00	2000.00	1430.00	919.00	736.00	323.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06208500 CLARKS FORK YELLOWSTONE RIVER AT EDGAR, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 39-YEAR PERIOD BETWEEN WATER YEARS 1931 AND 1969

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
8-01	2440.00	1930.00	1410.00	1050.00	835.00	620.00	560.00	350.00	179.00
8-02	2580.00	1610.00	1290.00	1010.00	792.00	636.00	540.00	350.00	137.00
8-03	3020.00	1530.00	1370.00	1140.00	813.00	535.00	512.00	350.00	128.00
8-04	2580.00	1750.00	1300.00	1180.00	774.00	499.00	415.00	340.00	111.00
8-05	2960.00	1390.00	1240.00	1060.00	687.00	448.00	376.00	314.00	112.00
8-06	2850.00	1420.00	1240.00	861.00	627.00	405.00	368.00	228.00	102.00
8-07	2510.00	1340.00	1190.00	819.00	560.00	405.00	350.00	205.00	91.00
8-08	2370.00	1170.00	1040.00	807.00	500.00	430.00	350.00	203.00	87.00
8-09	2010.00	1110.00	1060.00	798.00	532.00	392.00	338.00	257.00	84.00
8-10	1770.00	1060.00	1020.00	740.00	488.00	384.00	347.00	269.00	81.00
8-11	1690.00	1220.00	999.00	686.00	490.00	399.00	339.00	254.00	76.00
8-12	1620.00	1260.00	1040.00	686.00	499.00	369.00	342.00	228.00	74.00
8-13	1610.00	1190.00	1100.00	880.00	480.00	347.00	338.00	201.00	63.00
8-14	1620.00	1060.00	859.00	652.00	445.00	356.00	338.00	191.00	68.00
8-15	1500.00	1140.00	880.00	652.00	425.00	346.00	318.00	268.00	77.00
8-16	1410.00	1060.00	849.00	575.00	453.00	332.00	303.00	220.00	80.00
8-17	1280.00	1010.00	820.00	585.00	425.00	347.00	316.00	230.00	78.00
8-18	1290.00	910.00	810.00	560.00	387.00	347.00	261.00	195.00	89.00
8-19	1420.00	875.00	726.00	530.00	384.00	316.00	264.00	210.00	91.00
8-20	1330.00	950.00	774.00	647.00	368.00	299.00	265.00	208.00	84.00
8-21	2310.00	1100.00	774.00	625.00	418.00	300.00	266.00	196.00	92.00
8-22	2730.00	1000.00	700.00	605.00	411.00	302.00	255.00	186.00	71.00
8-23	3620.00	955.00	692.00	570.00	419.00	279.00	251.00	174.00	64.00
8-24	2750.00	969.00	642.00	575.00	425.00	275.00	251.00	166.00	84.00
8-25	2230.00	950.00	615.00	516.00	381.00	279.00	235.00	170.00	91.00
8-26	1870.00	950.00	625.00	448.00	385.00	287.00	212.00	168.00	111.00
8-27	1670.00	892.00	636.00	431.00	355.00	279.00	222.00	168.00	137.00
8-28	1510.00	881.00	710.00	444.00	368.00	277.00	230.00	168.00	137.00
8-29	1410.00	831.00	664.00	460.00	356.00	285.00	220.00	160.00	128.00
8-30	1380.00	819.00	631.00	520.00	350.00	288.00	218.00	160.00	120.00
8-31	1380.00	861.00	659.00	543.00	350.00	255.00	203.00	160.00	120.00
MEAN	1540.00	1240.00	834.00	739.00	482.00	381.00	350.00	283.00	102.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06208500 CLARKS FORK YELLOWSTONE RIVER AT EDGAR, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 39-YEAR PERIOD BETWEEN WATER YEARS 1931 AND 1969

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
9-01	1380.00	1030.00	729.00	550.00	368.00	245.00	198.00	171.00	137.00
9-02	1830.00	1050.00	693.00	555.00	371.00	277.00	232.00	182.00	146.00
9-03	1160.00	819.00	644.00	548.00	425.00	302.00	268.00	170.00	156.00
9-04	1360.00	783.00	652.00	550.00	415.00	296.00	275.00	176.00	137.00
9-05	1210.00	852.00	669.00	550.00	422.00	314.00	260.00	188.00	128.00
9-06	1120.00	700.00	610.00	532.00	428.00	300.00	268.00	177.00	137.00
9-07	3020.00	687.00	594.00	548.00	421.00	316.00	256.00	163.00	146.00
9-08	4460.00	798.00	560.00	522.00	411.00	302.00	244.00	168.00	129.00
9-09	1540.00	725.00	610.00	518.00	415.00	305.00	232.00	190.00	123.00
9-10	1170.00	754.00	605.00	550.00	425.00	310.00	255.00	195.00	129.00
9-11	1430.00	705.00	605.00	550.00	431.00	308.00	244.00	214.00	129.00
9-12	1380.00	759.00	580.00	550.00	426.00	318.00	245.00	228.00	155.00
9-13	1380.00	807.00	578.00	540.00	425.00	319.00	249.00	202.00	152.00
9-14	1320.00	783.00	620.00	550.00	419.00	314.00	258.00	198.00	161.00
9-15	1220.00	747.00	596.00	535.00	431.00	302.00	255.00	201.00	159.00
9-16	1220.00	883.00	630.00	550.00	423.00	288.00	262.00	188.00	169.00
9-17	1260.00	942.00	621.00	550.00	448.00	287.00	259.00	201.00	170.00
9-18	1120.00	934.00	605.00	550.00	470.00	305.00	267.00	201.00	168.00
9-19	4300.00	998.00	630.00	566.00	484.00	318.00	252.00	214.00	193.00
9-20	1910.00	992.00	645.00	595.00	472.00	340.00	275.00	232.00	183.00
9-21	1930.00	887.00	706.00	580.00	465.00	340.00	277.00	240.00	199.00
9-22	1660.00	1150.00	717.00	596.00	510.00	357.00	294.00	259.00	201.00
9-23	1160.00	1060.00	753.00	550.00	488.00	351.00	291.00	262.00	233.00
9-24	1170.00	978.00	740.00	555.00	471.00	351.00	318.00	277.00	243.00
9-25	1170.00	922.00	728.00	550.00	479.00	374.00	330.00	276.00	257.00
9-26	1170.00	950.00	711.00	560.00	448.00	391.00	336.00	288.00	254.00
9-27	1650.00	880.00	695.00	541.00	448.00	364.00	332.00	288.00	243.00
9-28	1650.00	838.00	665.00	550.00	450.00	363.00	347.00	288.00	228.00
9-29	1430.00	819.00	665.00	570.00	448.00	364.00	357.00	288.00	220.00
9-30	1650.00	935.00	699.00	555.00	472.00	388.00	339.00	288.00	210.00
MEAN	1400.00	799.00	657.00	589.00	425.00	346.00	319.00	254.00	192.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06208500 CLARKS FORK YELLOWSTONE RIVER AT EDGAR, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 39-YEAR PERIOD BETWEEN WATER YEARS 1931 AND 1969

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
10-01	1320.00	930.00	693.00	596.00	472.00	384.00	330.00	272.00	224.00
10-02	1770.00	807.00	670.00	560.00	472.00	388.00	330.00	272.00	224.00
10-03	1270.00	780.00	670.00	560.00	482.00	384.00	316.00	275.00	227.00
10-04	1220.00	780.00	640.00	560.00	479.00	374.00	330.00	275.00	212.00
10-05	1530.00	914.00	729.00	631.00	520.00	378.00	330.00	276.00	198.00
10-06	1530.00	857.00	699.00	605.00	510.00	384.00	339.00	276.00	188.00
10-07	1430.00	962.00	666.00	608.00	500.00	378.00	351.00	296.00	190.00
10-08	1430.00	915.00	666.00	631.00	500.00	384.00	345.00	296.00	192.00
10-09	1630.00	873.00	648.00	596.00	495.00	397.00	327.00	309.00	250.00
10-10	1530.00	824.00	625.00	566.00	488.00	397.00	345.00	312.00	233.00
10-11	1430.00	807.00	620.00	572.00	474.00	392.00	340.00	318.00	225.00
10-12	1530.00	787.00	670.00	560.00	472.00	396.00	380.00	321.00	224.00
10-13	1190.00	780.00	681.00	570.00	470.00	384.00	365.00	309.00	222.00
10-14	1060.00	840.00	668.00	610.00	478.00	396.00	383.00	303.00	216.00
10-15	1080.00	842.00	654.00	555.00	492.00	396.00	371.00	306.00	219.00
10-16	1040.00	925.00	678.00	550.00	492.00	405.00	375.00	318.00	231.00
10-17	1060.00	810.00	735.00	566.00	500.00	405.00	362.00	318.00	233.00
10-18	1020.00	848.00	716.00	566.00	500.00	418.00	374.00	318.00	227.00
10-19	969.00	810.00	666.00	588.00	500.00	418.00	353.00	310.00	235.00
10-20	907.00	810.00	717.00	602.00	515.00	415.00	353.00	318.00	232.00
10-21	934.00	849.00	679.00	585.00	500.00	405.00	362.00	334.00	228.00
10-22	888.00	843.00	686.00	585.00	515.00	418.00	384.00	336.00	232.00
10-23	845.00	813.00	680.00	580.00	495.00	423.00	373.00	339.00	270.00
10-24	845.00	795.00	665.00	572.00	495.00	405.00	376.00	336.00	291.00
10-25	845.00	771.00	686.00	610.00	495.00	418.00	384.00	339.00	297.00
10-26	1100.00	783.00	683.00	600.00	475.00	419.00	393.00	338.00	285.00
10-27	852.00	735.00	659.00	610.00	500.00	418.00	399.00	353.00	300.00
10-28	780.00	759.00	647.00	610.00	500.00	420.00	384.00	353.00	294.00
10-29	768.00	747.00	620.00	576.00	472.00	405.00	383.00	365.00	303.00
10-30	783.00	711.00	608.00	580.00	471.00	411.00	380.00	341.00	312.00
10-31	765.00	700.00	610.00	554.00	472.00	407.00	396.00	341.00	303.00
MEAN	1010.00	812.00	673.00	574.00	499.00	395.00	364.00	332.00	298.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06208500 CLARKS FORK YELLOWSTONE RIVER AT EDGAR, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 39-YEAR PERIOD BETWEEN WATER YEARS 1931 AND 1969

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
11-01	761.00	681.00	610.00	554.00	465.00	430.00	389.00	353.00	303.00
11-02	791.00	705.00	678.00	554.00	465.00	426.00	405.00	360.00	303.00
11-03	729.00	689.00	644.00	521.00	450.00	408.00	393.00	364.00	275.00
11-04	741.00	669.00	615.00	532.00	450.00	425.00	415.00	364.00	303.00
11-05	735.00	663.00	600.00	530.00	466.00	427.00	415.00	384.00	303.00
11-06	705.00	640.00	610.00	546.00	490.00	435.00	427.00	365.00	315.00
11-07	735.00	660.00	590.00	550.00	490.00	434.00	426.00	362.00	320.00
11-08	783.00	663.00	642.00	545.00	470.00	440.00	430.00	392.00	320.00
11-09	753.00	660.00	602.00	566.00	472.00	444.00	426.00	380.00	320.00
11-10	700.00	648.00	590.00	555.00	470.00	444.00	427.00	396.00	320.00
11-11	690.00	651.00	594.00	560.00	470.00	442.00	420.00	353.00	296.00
11-12	759.00	636.00	580.00	570.00	500.00	453.00	403.00	364.00	290.00
11-13	881.00	610.00	585.00	555.00	485.00	450.00	400.00	334.00	316.00
11-14	807.00	615.00	580.00	550.00	495.00	458.00	412.00	376.00	330.00
11-15	747.00	600.00	572.00	530.00	498.00	462.00	430.00	340.00	315.00
11-16	888.00	610.00	576.00	530.00	486.00	450.00	421.00	401.00	320.00
11-17	845.00	590.00	575.00	532.00	470.00	448.00	430.00	397.00	315.00
11-18	845.00	590.00	575.00	520.00	472.00	450.00	425.00	397.00	296.00
11-19	765.00	585.00	550.00	532.00	480.00	450.00	421.00	371.00	296.00
11-20	723.00	615.00	570.00	555.00	480.00	445.00	414.00	334.00	275.00
11-21	717.00	600.00	580.00	520.00	472.00	424.00	405.00	316.00	225.00
11-22	723.00	580.00	550.00	530.00	455.00	427.00	421.00	384.00	269.00
11-23	747.00	582.00	560.00	536.00	470.00	435.00	403.00	370.00	269.00
11-24	760.00	582.00	560.00	550.00	494.00	450.00	421.00	364.00	206.00
11-25	789.00	590.00	580.00	555.00	520.00	445.00	421.00	340.00	288.00
11-26	813.00	600.00	560.00	540.00	490.00	450.00	405.00	340.00	290.00
11-27	711.00	610.00	560.00	532.00	486.00	425.00	405.00	334.00	270.00
11-28	717.00	604.00	565.00	515.00	450.00	405.00	397.00	334.00	250.00
11-29	675.00	580.00	550.00	520.00	470.00	421.00	400.00	315.00	274.00
11-30	687.00	580.00	555.00	518.00	476.00	425.00	397.00	310.00	290.00
MEAN	728.00	601.00	567.00	531.00	491.00	441.00	425.00	364.00	311.00

UNITED STATES DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

STATION 06208500 CLARKS FORK YELLOWSTONE RIVER AT EDGAR, MT. DATE PROCESSED--07/25/75

PLOTTING POINTS FOR DURATION HYDROGRAPH FOR 39-YEAR PERIOD BETWEEN WATER YEARS 1931 AND 1969

DATE	HIGH	.10	.20	.30	.50	.70	.80	.90	LOW
12-01	723.00	587.00	544.00	530.00	480.00	421.00	380.00	350.00	290.00
12-02	720.00	582.00	544.00	526.00	471.00	425.00	397.00	350.00	290.00
12-03	653.00	576.00	555.00	524.00	470.00	442.00	420.00	340.00	290.00
12-04	686.00	560.00	540.00	500.00	470.00	430.00	397.00	315.00	262.00
12-05	653.00	550.00	535.00	500.00	448.00	397.00	360.00	315.00	208.00
12-06	580.00	558.00	530.00	510.00	448.00	364.00	320.00	300.00	186.00
12-07	576.00	540.00	515.00	490.00	440.00	350.00	340.00	279.00	202.00
12-08	640.00	528.00	515.00	472.00	450.00	400.00	320.00	251.00	168.00
12-09	700.00	535.00	500.00	470.00	430.00	359.00	320.00	299.00	188.00
12-10	760.00	525.00	500.00	480.00	421.00	360.00	320.00	293.00	191.00
12-11	747.00	523.00	500.00	490.00	420.00	350.00	330.00	283.00	202.00
12-12	759.00	525.00	500.00	480.00	430.00	355.00	315.00	280.00	215.00
12-13	723.00	565.00	498.00	465.00	421.00	350.00	299.00	250.00	196.00
12-14	648.00	544.00	480.00	470.00	421.00	350.00	290.00	240.00	202.00
12-15	642.00	560.00	480.00	470.00	418.00	370.00	290.00	240.00	200.00
12-16	653.00	544.00	489.00	470.00	425.00	350.00	288.00	250.00	202.00
12-17	664.00	520.00	485.00	460.00	400.00	345.00	270.00	250.00	202.00
12-18	653.00	488.00	466.00	448.00	410.00	350.00	299.00	260.00	175.00
12-19	636.00	488.00	460.00	440.00	400.00	365.00	340.00	250.00	196.00
12-20	609.00	490.00	460.00	460.00	410.00	360.00	340.00	283.00	202.00
12-21	609.00	500.00	476.00	460.00	430.00	370.00	320.00	290.00	196.00
12-22	630.00	554.00	488.00	460.00	420.00	365.00	340.00	270.00	191.00
12-23	725.00	554.00	480.00	460.00	420.00	360.00	320.00	260.00	186.00
12-24	700.00	520.00	470.00	450.00	410.00	350.00	308.00	240.00	186.00
12-25	700.00	500.00	480.00	440.00	390.00	320.00	260.00	240.00	177.00
12-26	650.00	520.00	450.00	430.00	390.00	300.00	260.00	220.00	169.00
12-27	600.00	532.00	450.00	410.00	370.00	300.00	260.00	215.00	154.00
12-28	550.00	499.00	440.00	420.00	375.00	320.00	270.00	210.00	151.00
12-29	600.00	490.00	477.00	430.00	391.00	300.00	280.00	220.00	180.00
12-30	640.00	500.00	480.00	440.00	385.00	314.00	275.00	222.00	180.00
12-31	620.00	480.00	470.00	448.00	400.00	340.00	275.00	222.00	180.00
MEAN	583.00	484.00	467.00	452.00	423.00	383.00	355.00	320.00	217.00

Appendix B

United States Department of the Interior

GEOLOGICAL SURVEY
Water Resources Division
301 South Park Avenue, Room 428
Federal Building, Drawer 10076
Helena, Montana 59626-0076

November 30, 1983

Fred Nelson
Dept. of Fish, Wildlife and
Parks
8695 Huffine Lane
Bozeman, Montana 59715

Dear Fred:

Enclosed is a listing of preliminary data, in cubic feet per second, for the streams measured in the first phase of the study. The astericks indicate the 50th percentiles for the irrigation months, and the remaining months are 20th percentile figures. We plan to put the data in final form and mail a letter report to you in the next couple of months.

If you have any questions or need additional information, please let us know as soon as possible.

Sincerely,

Joe A. Moreland

Joe A. Moreland
Acting District Chief

Enclosures

Stream

	North Fork Bear Creek at Jardine	Bear Creek above North Fork at Jardine.	Bear Creek below North Fork at Jardine	Mol Heron Creek above Cinnabar Creek near Corwin Springs	Cinnabar Creek above Cottonwood Creek near Corwin Springs	Cinnabar Creek at mouth near Corwin Springs
Mean Annual	21.9	36.5	58.8	23.7	10.4	12.4
Jan	5.62	9.61	15.9	6.11	2.57	3.09
Feb	5.37	9.18	15.1	5.83	2.46	2.95
March	6.29	10.6	17.2	6.82	2.94	3.52
April	21.2	32.1	47.2	22.6	11.6	13.4
* May	37.8	60.7	94.6	40.6	18.9	22.2
* June	90.6	148	234	97.8	44.3	52.5
* July	31.9	56.0	94.6	34.8	14.1	17.1
* Aug	11.4	20.4	35.0	12.5	4.94	6.02
* Sept	8.61	15.2	25.8	9.40	3.77	4.58
Oct	9.54	16.7	28.0	10.4	4.24	5.13
Nov	8.89	15.0	24.6	9.64	4.13	4.95
Dec	7.22	12.2	19.8	7.83	3.38	4.04

* ... percentiles for the irrigation season

Stream

	Cedar Creek near Cowin Springs	Tom Miner Creek above Canyon Creek near Cowin Springs	Tom Miner Creek at mouth near Cowin Springs	Rocky Creek at mouth near Cowin Springs	Similee Creek above diversion near Emigrant	Fridley Creek above Miller Creek near Emigrant
Mean Annual	8.90	61.2	56.6	22.7	33.1	19.3
Jan	2.18	16.5	15.0	5.84	8.67	4.92
Feb	2.08	15.8	14.3	5.57	8.28	4.70
March	2.51	17.9	16.3	6.52	9.58	5.53
April	10.2	48.8	45.1	21.8	29.6	19.1
May	16.3	98.2	89.8	39.0	56.4	33.6
June	38.2	243	222	93.8	135	80.2
July	11.8	98.8	88.9	33.2	50.3	27.8
Aug	4.14	36.6	32.8	11.9	18.3	9.93
Sept	3.17	26.9	24.2	8.96	13.6	7.48
Oct	3.58	29.2	26.3	9.92	15.0	8.31
Nov	3.52	25.6	23.2	9.22	13.6	7.80
Dec	2.88	20.6	18.7	7.49	11.0	6.35

Stream

	Fridley Creek at mouth near Emigrant	Eightmile Creek above diversions near Emigrant	Mill Creek at Forest Service Boundry near Pray	Reep Creek near Livingston	Trail Creek above Pine Creek near Livingston	Suce Creek near Livingston
Mean Annual	6.82	24.2	156	12.4	20.1	6.18
Jan	1.65	6.24	44.2	3.09	5.14	1.49
Feb	1.58	5.96	42.2	2.95	4.90	1.42
March	1.91	6.96	46.6	3.52	5.76	1.73
April	8.24	23.0	104	13.4	19.8	7.61
May	12.8	41.4	234	22.2	34.9	11.6
June	29.6	99.7	597	52.5	83.4	26.9
July	8.84	35.6	277	17.1	29.0	7.93
Aug	3.06	12.8	105	6.02	10.4	2.74
Sept	2.36	9.62	76.1	4.58	7.83	211
Oct	2.68	10.6	81.1	5.13	8.69	2.40
Nov	2.67	9.85	67.2	4.95	8.14	2.42
Dec	2.20	8.00	53.5	4.04	6.62	1.99

Stream

	Billman Creek above Miner Creek near Livingston	Miner Creek near Livingston	Billman Creek at mouth near Livingston	Fleshman Creek at mouth near Livingston		
Mean Annual	11.2	8.32	18.1	5.47		
Jan	2.78	2.03	4.60	1.31		
Feb	2.66	1.94	4.39	1.25		
March	3.17	2.34	5.18	1.53		
April	12.3	9.68	18.2	6.89		
May	20.2	15.4	31.6	10.4		
June	47.6	35.8	75.4	23.9		
July	15.3	11.0	25.9	6.94		
Aug	5.37	3.84	9.23	2.39		
Sept	4.09	2.94	6.97	1.85		
Oct	4.59	3.32	7.75	2.10		
Nov	4.46	3.28	7.30	2.13		
Dec	3.64	2.69	5.95	1.75		